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R M Cooper Jr

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AND

THOMAS T. HEWSON, M.D.,

AS

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FOR

THEIR PRIVATE WORTH AND PROFESSIONAL CHARACTER,

AND AS

AN ACKNOWLEDGMENT

OF

THEIR NUMEROUS KIND OFFICES,

THIS WORK

IS RESPECTFULLY INSCRIBED

BY

THEIR FRIENDS,

THE AUTHORS.

R McCooper Jr
Nov-1st 1836
Univ of Pen

PREFACE

TO

THE FIRST EDITION.

The objects of a Dispensatory are to present an account of medicinal substances in the state in which they are brought into the shops, and to teach the modes in which they are prepared for use. The importance of these objects, and the general value and even necessity of a work of this nature, will not be disputed. It may, however, be a question, how far the wants of the medical and pharmaceutical community in this country are supplied by the Dispensatories already in circulation; and whether such a deficiency exists as to justify the offer of a new one to the public attention. The great merits of the works severally entitled "The Edinburgh New Dispensatory," and "The London Dispensatory," the former edited by the late Andrew Duncan, M.D., the latter by Anthony Todd Thomson, M.D., are well known wherever the English language is spoken. Founded, as they both are, upon the excellent basis laid by Lewis, they are nevertheless entitled, from the great addition of valuable materials, and the distinctive character exhibited in the arrangement of these materials, to be considered as original works; while the style in which they have been executed speaks strongly in favour of the skill and industry of their authors. But they were calculated especially for the sphere of Great Britain, and are too deficient in all that relates exclusively to this country, to admit of being received as standards here. In the history of our commerce in drugs, and of the nature, growth, and collection of our indigenous medical plants; in the chemical operations of our extensive laboratories; and in the modes of preparing, dispensing, and applying medicines, which have gradually grown into use among us; there is much that is peculiar, a knowledge of which is not to be gained from foreign books, and is yet necessary to the character of an accomplished American pharmaceutist. We have, moreover, a National Pharmacopœia, which requires an explanatory commentary, in order that its precepts may be fully appreciated, and advantageously put into practice. On these accounts it is desirable that there should be a Dispensatory of the United States, which, while it embraces whatever is useful in European pharmacy, may accurately represent the art as it exists in this country, and give instruction adapted to our peculiar wants. It appears due to our national character, that such a work should be in good faith an American work, newly prepared in all its parts, and not a mere edition of one of the European Dispensatories, with here and there additions and alterations, which, though they may be useful in themselves, cannot be made to harmonize with the other materials so as to give to the whole an appearance of unity, and certainly would not justify the assumption of a new and national title for the book. Whether in the Dispensatories which have been published in the United States, these requisites have been satisfactorily fulfilled, it rests with the public to determine. That valuable treatises on Materia Medica and Pharmacy have been issued in this country, no candid person, acquainted with our medical literature, will be disposed to deny. In offering a new work to the medical and pharmaceutical professions, the authors do not wish to be considered as undervaluing the labours of their predecessors. They simply conceive, that the field has not been so fully occupied as to exclude all competition. The pharmacy of continental Europe is ground which has been almost untouched; and much information in relation to the natural history, commerce, and management of our own drugs, has lain ungathered in the possession of individuals, or scattered in separate treatises and periodicals not generally known and read. Since the publication of the last edition of our National Pharmacopœia, no general explanation of its processes has appeared, though required in justice both to that work and to the public. The hope of being able to supply these deficiencies, may, perhaps, be considered a sufficient justification for the present undertaking.

The Pharmacopœia of the United States has been adopted as the basis of this Dispensatory. It is followed both in its general division of medicines, and in its alphabetical arrangement of them under each division. Precedence is, in every instance, given to the names which it recognises; while the explanations by which it fixes the signification of these names, are inserted in immediate connexion with the titles to which they severally belong. Every article which it designates is more or less fully described; and all its processes, after being literally copied, are commented on and explained whenever comment or explanation appeared necessary. Nothing, in fine, has been omitted, which, in the estimation of the authors, could serve to illustrate its meaning or promote the ends which it was intended to subserve. This course of proceeding appeared to be due to the national character of the Pharmacopœia, and to the important object of establishing, as far as possible, throughout the United States, uniformity both in the nomenclature and preparation of medicines. In one particular, convenience required that the plan of the Pharmacopœia should be departed from. The medicines belonging to the department of MATERIA MEDICA, instead of being arranged in two divisions, corresponding with the *Primary* and *Secondary Catalogues* of that work, have been treated of indiscriminately in alphabetical succession; and the place which they respectively hold in the Pharmacopœia is indicated by the employment of the term *Secondary*, in connexion with the name of each of the medicines included in the latter catalogue.

But though precedence has thus been given to the Pharmacopœia of the United States, those of Great Britain have not been neglected. The nomenclature adopted by the different British Colleges, and their formulæ for the preparation of medicines, have been so extensively followed throughout the United States, that a work intended to represent the present state of pharmacy in this country would be imperfect without them; and the fact that the writings of British physcians and surgeons, in which their own officinal terms and preparations are exclusively employed and referred to, have an extensive circulation among us, renders some commentary necessary in order to prevent serious mistakes. The Pharmacopœias of London, Edinburgh, and Dublin, have, therefore, been incorporated, in all their essential parts, into the present work. Their officinal titles are uniformly given—always in subordination to those of the United States Pharmacopœia, when they express the same object; but in chief, when, as often happens, no corresponding medicine or preparation is recognised by our national standard. In the latter case, if different names are applied by different British Colleges to the same object, that is generally preferred which is most in accordance with our own system of nomenclature, and the others are given as synonymes. The medicines directed by the British Colleges are all described, and their processes either copied at length, or so far explained as to be intelligible in all essential particulars.

Besides the medicinal substances recognised as officinal by the Pharmacopœias alluded to, some others have been described, which, either from the lingering remains of former reputation, or from recent reports in their favour, or from their important relation to medicines in general use, appear to have claims upon the attention of the physician and apothecary. Opportunity has, moreover, been taken to introduce incidentally brief accounts of substances used in other countries or in former times, and occasionally noticed in medical books; and that the reader may be able to refer to them when desirous of information, their names have been placed with those of the standard remedies in the Index.

In the description of each medicine, if derived immediately from the animal, vegetable, or mineral kingdom, the attention of the authors has been directed to its natural history, the place of its growth or production, the method of collecting and preparing it for market, its commercial history, the state in which it reaches us, its sensible properties, its chemical composition and relations, the changes which it undergoes by time and exposure, its accidental or fraudulent adulterations, its medical properties and application, its economical uses, and the pharmaceutical treatment to which it is subjected. If a chemical preparation, the mode and principles of its manufacture are indicated in addition to the other particulars. If a poison, and likely to be accidentally taken, or purposely employed as such, its peculiar toxicological effects, together with the mode of counteracting them, are indicated; and the best means of detecting its presence by reagents are explained.

The authors have followed the example of Dr. A. T. Thomson, in giving botanical descriptions of the plants from which the medicines treated of are derived. In relation to all indigenous medicinal plants, and those naturalized or cultivated in this country, the advantages of such descriptions are obvious. The physician may often be placed in situations, in which it may be highly important that he should be able to recognise the vegetable which yields a particular medicine; and the apothecary is constantly liable to imposition from the collectors of herbs, unless possessed of the means of distinguishing by infallible marks the various products presented to him. A knowledge of foreign medicinal plants, though of less importance, will be found useful in various ways, independently of the gratification afforded by the indulgence of a liberal curiosity in relation to objects so closely connected with our daily pursuits. The introduction of these botanical notices into a Dispensatory appears to be peculiarly appropriate, as they are to be considered rather as objects for occasional reference than for regular study or continuous perusal, and therefore coincide with the general design of the work, which is to collect into a convenient form for consultation all that is practically important in relation to medicines. The authors have endeavoured to preserve a due proportion between the minuteness of the descriptions, and their value as means of information to the student; and, in pursuance of this plan, have generally dwelt more at length upon our native plants, than upon those of foreign growth: but in all instances, in which they have deemed any botanical description necessary, they have taken care to include in it the essential scientific character of the genus and species, with a reference to the position of the plant in the artificial and natural systems of classification; so that a person acquainted with the elements of botany may be able to recognise it when it comes under his observation.

In preparing the Dispensatory, the authors have consulted, in addition to many of the older works of authority, the greater number of the treatises and dissertations which have recently appeared upon the various subjects connected with Pharmacy, and especially those of the French writers, who stand at present at the head of this department of medical science. They have also endeavoured to collect such detached facts scattered through the various scientific, medical, and pharmaceutical journals, as they conceived to be important in themselves, and applicable to the subjects under consideration; and have had frequent recourse to the reports of travellers in relation to the natural and commercial history of foreign drugs. The occasional references in the body of the work will indicate the sources from which they have most largely drawn, and the authorities upon which they have most relied. In relation to our own commerce in drugs and to the operations of our chemical laboratories, they are indebted for information chiefly to the kindness of gentlemen engaged in these branches of business, who have always evinced, in answering their numerous inquiries, a promptitude and politeness which merit their warm thanks, and which they are pleased to have this opportunity of acknowledging.*

It has not been deemed necessary to follow the example of the British Dispensatories, by inserting into the work a treatise upon Chemistry under the name of Elements of Pharmacy. Such a treatise must necessarily be very meagre and imperfect; and, as systems of chemistry are in the hands of every physician and apothecary, would uselessly occupy the place of valuable matter of less easy access.

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* The authors deem it proper to state that they are peculiarly indebted for assistance to Mr. Daniel B. Smith, president of the Philadelphia College of Pharmacy, to whom, besides much important information in relation to the various branches of the Apothecary's business, they owe the prefatory remarks on Pharmacy which are placed at the commencement of the second part of the work, and the several articles, in the Materia Medica, upon *Leeches*, *Litmus*, and the *Carbonate* and *Sulphate of Magnesia*.

The authors may perhaps be permitted to observe, in relation to themselves, that they have expended much time and labour in the preparation of the work; have sought diligently for facts from every readily accessible source; have endeavoured by a comparison of authorities, and a close scrutiny of evidence, to ascertain the truth whenever practicable; and have exerted themselves to the extent of their abilities to render the Dispensatory worthy of public approbation, both for the quality and quantity of its contents, and the general accuracy of its statements. They are conscious, nevertheless, that in so great a multiplicity of details numerous errors and deficiencies may exist, and that the faults of undue brevity in some cases, and prolixity in others, may not have been entirely avoided: but they venture to hope that a candid public will make all due allowances; and they take the liberty to invite from all those who may feel interested in the diffusion of sound pharmaceutical knowledge, the communication of friendly suggestions or criticisms in relation to the objects and execution of the work.

Philadelphia, January, 1833.

PREFACE

TO

THE THIRD EDITION.

In preparing the second edition of the Dispensatory, the authors bestowed much labour upon the work, correcting errors, curtailing superfluities, and supplying deficiencies, whenever observed, and enlarging the original plan by the addition of an Appendix, containing notices and descriptions of numerous drugs, which, though not recognised in the American or British Pharmacopœias, were possessed of some interest from their former or existing relations to Medicine and Pharmacy. Their object was to compress, within convenient limits, all the information concerning medicinal substances which could be deemed essential or peculiarly interesting to the physician and apothecary. They are gratified in being able to infer, from the rapidity with which the late edition, though a large one, has been exhausted, that the public confidence has not been withdrawn from the work. In its revision for the present edition, they have endeavoured to render it still more worthy of this confidence by correcting errors which had previously escaped their notice, introducing whatever new facts and views have been developed in the progress of research, and bringing it, in all respects, as nearly as possible, to a level with the existing state of knowledge in relation to Materia Medica and Pharmacy. Several substances, not noticed in the former editions, have been treated of in the present; and a table of pharmaceutical equivalents has been introduced into the Appendix, which will be found very convenient for reference, both to the student and practitioner. It may be proper in addition to mention, that a few articles, treating of substances not included in the officinal catalogues, have been transferred from the Materia Medica to the Appendix; so that the first part of the work is now devoted exclusively to the consideration of those medicines which are recognised as such, either in the British Pharmacopœias, or in that of the United States. The authors avail themselves of this opportunity to offer their best thanks to those who have kindly pointed out errors or defects which had escaped their own attention; and they repeat their invitation for such friendly suggestions as may contribute to render the Dispensatory more useful, should it reach another edition.

Philadelphia, June, 1836.

Abbreviations employed in the Work.

U. S.—"THE PHARMACOPŒIA OF THE UNITED STATES OF AMERICA. By authority of the National Medical Convention, held at Washington, A. D. 1830."

Lond.—LONDON PHARMACOPŒIA, A. D. 1824.

Ed.—EDINBURGH PHARMACOPŒIA, A. D. 1817.

Dub.—DUBLIN PHARMACOPŒIA, A. D. 1826.

Off. Syn.—OFFICINAL SYNONYMES, or the titles employed by the Pharmacopœias with the accompanying explanations, when these titles are not given in chief.

Sex. Syst.—The SEXUAL SYSTEM, or the artificial system of Linnæus, founded on the sexual organization of plants.

Nat. Ord.—The NATURAL ORDER to which any particular genus of plants belongs. When not otherwise stated, it is to be understood that the natural orders referred to are those recognised by Professor Lindley, of the University of London, in his "Introduction to the Natural System of Botany."

Gen. Ch.—The GENERIC CHARACTER, or scientific description of any particular genus of plants under consideration.

Off. Prep.—OFFICINAL PREPARATIONS; including all the preparations into which any particular medicine directed by the U. S. Pharmacopœia and the British Colleges enters. When the same preparation has received different names in the different Pharmacopœias, only one of these names is mentioned, and precedence is always given to that of the U. S. Pharmacopœia.

Sp. Gr.—SPECIFIC GRAVITY.

Equiv., or *Eq.*—CHEMICAL EQUIVALENT, or the number representing the smallest quantity in which one body usually combines with others.

Linn. LINNÆUS.—*Juss.* JUSSIEU.—*De Cand.* DE CANDOLLE.—*Willd. Sp. Plant.*, WILLDENOW'S EDITION OF THE SPECIES PLANTARUM OF LINNÆUS.—*Woodv. Med. Bot.* WOODVILLE'S MEDICAL BOTANY, 2d edition.—*B.* BAUME'S HYDROMETER.

Fr., FRENCH.—*Germ.*, GERMAN.—*Ital.*, ITALIAN.—*Span.*, SPANISH.—*Arab.*, ARABIC.

THE DISPENSATORY OF THE UNITED STATES.

PART I.

MATERIA MEDICA.

The Materia Medica, in its most comprehensive sense, embraces all those substances which are capable of making sanative impressions on the human system; but, as the term is employed in this work, it has a more restricted signification. The Pharmacopœias of the United States and Great Britain very appropriately arrange medicines in two distinct divisions, one including all those which are furnished immediately by nature, or thrown into commerce by the manufacturer; the other, those which are prepared by the apothecary, and are the objects of officinal directions. The former are enumerated under the title of "Materia Medica;" the latter under that of "Preparations," or "Preparations and Compositions." In Dispensatories, which may be considered as commentaries on the Pharmacopœias, the same arrangement is usually followed; and the authors of the present work adopt it the more willingly, as, independently of the weight of authority in its favour, it has the recommendation of being the most convenient. By this plan, all the directions which relate to the practical operations of the apothecary are collected in one place, and are thus more easily referred to, than if mixed indiscriminately with other matters, as they must be by any mode of arrangement which makes no distinction between the original medicinal substances and their preparations. Under the head of Materia Medica, therefore, in this Dispensatory, we treat of medicines in the state only in which they are produced by nature, or come into the hands of the apothecary. Of these medicines, such as are recognised by our National Pharmacopœia are most minutely described; but we consider also all that are included in the officinal catalogues of the British Colleges.

Another point in which we accord with the Pharmacopœias, is the alphabetical arrangement of the objects of the Materia Medica. As a Dispensatory is intended rather for reference than for regular perusal, it is important that its contents should be so disposed as to facilitate consultation. Medicines, in a work of this kind, are considered as independent objects, to be studied separately, and without any reference to community of source, or similarity of character. Their scientific classification belongs to works which treat of them rather in their relations than their essential properties; and different systems have been adopted, according to the set of relations towards which the mind of the author has been especially directed. Thus, the naturalist classifies them according to the affinities of the several objects in nature from which they are derived; the chemist, according to their composition; the practitioner of medicine, according to their effects upon the system in a state of health and disease. But none of these classifications is without imperfections; and a simple alphabetical arrangement is decidedly preferable in every case in which the medicines are considered solely in their individual capacity. Yet, as it comes within the scope of this work to treat of their physiological and therapeutical effects, and as the terms by which these effects are expressed are also the titles of classes to which the medicines belong, it will not be amiss to present the reader with the outlines of a system of classification, by consulting which he will be enabled to ascertain the precise meaning we attach to the terms employed to designate the peculiar action of different medicinal substances.

Remedies are divided into general and local, the former acting on the whole system, the latter on particular parts or organs.

I. GENERAL REMEDIES include 1. SIMPLE STIMULANTS, sometimes called INCITANTS, which, while they raise the actions of the system above the standard of health, exhibit their influence chiefly upon the heart and arteries; 2. NARCOTICS, which especially affect the cerebral functions, and are either *stimulant* or *sedative* according as they increase or diminish the natural actions; 3. ANTISPASMODICS, which, with a general stimulant power, exert a peculiar influence over the nervous system, exhibited in the relaxation of spasm, the calming of nervous irritation, &c.; without any special and decided tendency to the brain; 4. TONICS, which moderately and permanently exalt the energies of all parts of the frame, without necessarily producing any apparent increase of the natural actions; and 5. ASTRINGENTS, which, with more or less tonic power, have the property of producing contraction in the living fibre wherever they come in contact with it.

II. LOCAL REMEDIES may be divided into four sections: *a. Those affecting the function of a part*, namely, 1. EMETICS, which act on the stomach, producing vomiting; 2. CATHARTICS, which act on the bowels, producing a purgative effect; 3. DIURETICS, which act on the kidneys, producing an increased flow of urine; 4. ANTILITHICS, which act on the same organs, preventing the formation of calculous matter; 5. DIAPHORETICS, which increase the cutaneous discharge; 6. EXPECTORANTS, which augment the secretion from the mucous membrane of the bronchi, or promote the discharge of the secreted matter; 7. EMMENAGOGUES, which excite the menstrual secretion; 8. SIALAGOGUES, which increase the flow of saliva; and 9. ERRHINES, which increase the discharge from the mucous membrane of the nostrils: *b. Those affecting the organization of a part*, including 1. RUBEFACIENTS, which produce redness and inflammation of the skin; 2. EPISPASTICS or VESICATORIES, which produce a serous discharge beneath the cuticle, forming a blister; and 3. ESCHAROTICS or CAUSTICS, which destroy the life of the part upon which they act: *c. Those operating by a mechanical agency*, consisting of 1. DEMULCENTS, which lubricate the surface to to which they are applied, and prevent the contact of irritating substances, or mingle with these and diminish their acrimony; and 2. EMOLLIENTS, which serve as vehicles for the application of warmth and moisture, at the same time excluding the air: *d. Those which act on extraneous matters contained within the organs*, including 1. ANTHELMINTICS, which destroy worms or expel them from the bowels; and 2. ANTACIDS, which neutralize acid, whether existing in the alimentary canal, or circulating with the blood.

It is believed that all substances employed as medicines, with the exception of a very few which are so peculiar in their action as scarcely to admit of classification, may be distributed without violence among the above classes. Some substances, however, in addition to the properties of the classes to which they are severally attached, possess others in common, which give them practical value, and authorize their association in distinct groups, not recognized in the system of classification, but constantly referred to in medical language. Thus we have REFRIGERANTS, which, when internally administered, diminish animal temperature; ALTERATIVES, which change, in some inexplicable and insensible manner, certain morbid actions of the system; and CARMINATIVES, which, by promoting contraction in the muscular coat of the stomach and bowels, cause the expulsion of flatus. It is common, moreover, to attach distinct names to groups of remedies, with reference to certain effects which are incident to the properties that serve to arrange them in some more comprehensive class. Thus NARCOTICS frequently promote sleep and relieve pain, and in relation to these properties are called SOPORIFICS and ANODYNES; and various medicines, which by diversified modes of action serve to remove chronic inflammation and enlargements of the glands or viscera, are called DEOBSTRUENTS. These terms are occasionally employed in the following pages, and are here explained, in order that the sense in which we use them may be accurately understood. W.

ACACIÆ GUMMI. *U.S.*

Gum Arabic.

"Acacia vera. Succus concretus. *The concrete juice.*" *U.S.*

Off. Syn. ACACIÆ GUMMI. Acacia vera. Gummi. *Lond.;* ACACIÆ ARABICÆ GUMMI. Ex variis Acaciæ speciebus. *Ed.;* ACACIA ARABICA et ACACIA VERA. Gummi. *Dub.*

Gomme Arabique, *Fr.;* Arabisches Gummi, *Germ.;* Gomma Arabica, *Ital.;* Goma Arabiga, *Span.;* Samagh Arebee, *Arab.*

ACACIA. *Sex. Syst.* Polygamia Monœcia.—*Nat. Ord.* Leguminosæ, *Trib.* Mimoseæ.

This genus is one of those into which the old genus Mimosa of Linnæus was divided by Willdenow. The name *Acacia* was employed by the ancient Greeks to designate the gum-tree of Egypt, and has been appropriately applied to the new genus in which that plant is included.

Gen. Ch. HERMAPHRODITE. *Calyx* five-toothed. *Corolla* five-cleft, or formed of five petals. *Stamens* 4–100. *Pistil* one. *Legume* bivalve. MALE. *Calyx* five-toothed. *Corolla* five-cleft, or formed of five petals. *Stamens* 4–100. *Willd.*

Several species of Acacia contribute to furnish the gum Arabic of the shops. Those which have attracted most attention are the *A. vera* and *A. Arabica*, confounded together by Linnæus under the title of *Mimosa Nilotica.**

Acacia vera. Willd. *Sp. plant.* iv. 1805; Hayne, *Darstel. und Beschreib. &c.* x. 34. This is a tree of middling size, with numerous scattered branches, of which the younger are much bent, and covered with a reddish-brown bark. The leaves are alternate and bipinnate, with two pairs of pinnæ, of which the lower are usually furnished with ten pairs of leaflets, the upper with eight. The leaflets are very small, oblong-linear, smooth, and supported upon very short footstalks. On the common petiole is a gland between each pair of pinnæ. Both the common and partial petiole are smooth. Two sharp spines or rather prickles, from a quarter to half an inch long, of the colour of the smaller branches, and joined together at their base, are found at the insertion of each leaf. The flowers are yellow, inodorous, small, and collected in globular heads supported upon slender peduncles, which rise from the axils of the leaves, in number from two to five together. The fruit is a smooth, flat, two-valved legume, divided by contractions, occurring at regular intervals, into several roundish portions, each containing a single seed. This species flourishes in Upper Egypt and Senegal, and is probably scattered over the whole intervening portions of the African continent. The Acacia of the Cape of Good Hope, considered by Sparrman and Thunberg as the Mimosa Nilotica of Linn., and hence treated by some authors as identical with the present species, appears to be distinct, and has received the name of *Acacia Karroo*. It exudes a gum, which is said to be used at the Cape.

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* Since the publication of the first edition of this Dispensatory, we have had an opportunity of examining Hayne's great work on medical plants, entitled *Getreue Darstellung und Beschreibung der in der Arzneykunde gebräuchlichen Gewächse*, &c., which has been for several years in the course of publication at Berlin. The account of the Acacias which yield gum Arabic, presented by this author, is the most satisfactory that we have seen; and we have freely availed ourselves in the present edition of the information which he furnishes. This is the more valuable, as much of it was derived from Dr. Ehrenberg, a scientific German traveller, who visited many of the regions where gum Arabic is collected, and had an opportunity of personally inspecting the plants from which it is derived.—*Note to second edition.*

A. Arabica. Willd. *Sp. Plant.* iv. 1805; Hayne, *Darstel. und Beschreib.* x. 32.—*Acacia Nilotica*, Delil. *Ill. flor. de l'Egypt.* p. 79.—*Acacia vera.* Vesling. *Ægypt.* p. 8. This species, though often little more than a shrub, attains in favourable situations the magnitude of a considerable tree, being sometimes forty feet high, with a trunk a foot or more in diameter. The leaves are alternate and doubly pinnate, having from four to six pairs of pinnæ, each of which is furnished with from ten to twenty pairs of minute, smooth, oblong-linear leaflets. The common petiole has a gland between the lowest pair of pinnæ, and often also between the uppermost pair. Both the common and partial petiole, as well as the young branches, are downy. The prickles are straight, and disposed as in the former species. The flowers are also arranged as in the A. vera, and the fruit is of a similar shape. The A. Arabica is perhaps the most widely diffused of the gum-bearing species. It grows in Upper and Lower Egypt, Senegal, and other parts of Africa, flourishes also in Arabia, and is abundant in Hindostan, where its gum is used for food by the natives.

Besides the two species above described, the following afford considerable quantities of gum:—The *A. Senegal*, a small tree, inhabiting the hottest regions of Africa, and said to form vast forests in Senegal; the *A. gummifera*, seen by Broussonet in Morocco near Mogador; the *A. Ehrenbergiana*, a shrub six or eight feet high, named in honour of the German traveller Ehrenberg, who observed it in the deserts of Lybia, Nubia, and Dongola; the *A. Seyal*, growing in the same countries with the last mentioned species, and also in Upper Egypt; and the *A. tortilis*, which sometimes attains the height of sixty feet, and inhabits Arabia Felix, Nubia, Dongola, and the Lybian desert. It is highly probable that gum is obtained also from other species not hitherto described, growing in the hot latitudes of Africa. The *A. decurrens* and *A. floribunda*, natives of New Holland, yield by exudation a tolerably pure gum, which has not yet, however, been extensively collected. Other trees, moreover, not belonging to the genus, afford a similar product, especially the *Feronia elephantum* of Hindostan, the gum of which, according to Ainslie, is used for medical purposes by all the practitioners of Lower India.

The gum-bearing Acacias are all thorny or prickly trees or shrubs, calculated by nature for a dry and sandy soil, and flourishing in deserts where few other trees will grow. We are told that camels attached to the caravans derive from them their chief sustenance in many parts of those desolate regions in which Africa abounds. In these situations they have a stunted growth, and present a bare, withered, and uninviting aspect; but in a favourable situation, as on the banks of rivers, they often assume a luxuriant and elegant appearance.

Their bark and unripe fruit contain tannin and gallic acid, and are sometimes used for tanning leather. An extract was formerly obtained from the immature pods of the *A. Arabica* and *A. vera*, by expression and inspissation. It was known to the ancients by the name of *acaciæ veræ succus*, and was highly lauded by some of the Greek medical writers. It is at present little used, though described in most of the European works on Pharmacy. It is a solid, heavy, shining, reddish-brown substance, of a sweetish, acidulous, styptic taste, and soluble in water. Its virtues are probably those of a mild astringent. On the continent of Europe, a preparation is said to be usually substituted for it called *acacia nostras*, obtained by expression and inspissation from the unripe fruit of the *Prunus spinosa*, or wild plum tree.

The gum of the Acacias exudes spontaneously from the bark of the trunk and branches, and hardens on exposure; but incisions are sometimes made in order to facilitate the exudation. This is supposed by some to be favoured by disease, and it is stated by Jackson, that, in Morocco, the greatest product is obtained in the driest and hottest weather, and from the most sickly trees. An elevated temperature appears to be essential; for in cooler climates, though the tree may flourish, it yields no gum. According to Ehrenberg, the varieties in the colour and other characters of the gum do not depend upon difference in the species of the plant. Thus, from the same tree, the gum will exude frothy or thick, and clear or dark coloured, and will assume, upon hardening, different shapes and sizes; so that the pieces, when collected, require to be assorted before being delivered into commerce.

Commercial History. Gum Arabic was formerly procured, chiefly, if not exclusively, from Egypt and the neighbouring countries; and much is still obtained from the same sources. It is collected in Upper Egypt, Nubia, and Darfur, whence it is taken down the Nile to Alexandria. A considerable quantity is also brought to the same port from Arabia. We obtain it in this country through Smyrna, Trieste, Marseilles, or some other entrepot of the Mediterranean commerce. Two varieties of the gum have long been noticed, one more or less coloured, the other white, which were formerly, and, on the continent of Europe, are still distinguished by the titles of *gum gedda*, and *gum turic*, derived from the ports of the Red Sea, Jidda and Tor, from which the varieties were erroneously supposed to be respectively exported. The gum from Egypt is commonly known to our druggists by the name of *Turkey gum*, and is the kind with which the apothecaries are usually supplied. Though interspersed with roundish pieces of various sizes, it consists chiefly of small, irregular fragments, which are commonly whitish, or slightly tinged with yellow or reddish-yellow. It is on the whole lighter coloured, more brittle, more readily soluble, and much freer from impurities than the other commercial varieties, and contains much of that form of gum Arabic, which is characterized by innumerable minute fissures pervading its substance, and impairing its transparency. The best comes in cases.

Much gum Arabic is at present obtained from Barbary; and Mogador, a port of Morocco, is the chief entrepot of the trade. According to Jackson, the natives call the tree which affords it *attaleh*. They gather it in the months of July and August, when the weather is hot and very dry. Two kinds are brought to Mogador, one from the neighbouring provinces, the other by caravans from Timbuctoo. This may account for the fact that the *Barbary gum* in part resembles the Turkey, in part the Senegal. When first deposited in the warehouses, it has a faint smell, and makes a crackling noise, occasioned by the spontaneous rupture of the small masses as they become more dry. The Barbary gum is exported in casks, and reaches the U. States through the route of English commerce.

Gum Senegal, which is a mere commercial variety of this drug, was first introduced into Europe by the Dutch. The French afterwards planted a colony on the western coast of Africa, and took possession of the trade; but since the last great European war, it has been largely shared by the English. St. Louis, at the mouth of the Senegal, and Portendic, considerably further north, are the ports in which the commerce in gum has chiefly centered. Immense forests of the Acacia exist at some distance in the interior. These are composed chiefly of two different trees, called by the natives *vereck* or *nereck*, and *nebuel*, or *nebued*, the former of which yields a white gum, the latter a red. These are probably distinct species, the *vereck* being, according to M. Rain, the *A. vera*, and the *nebuel* the *A. Senegal.* According to Adanson, there are several other species in the neighbourhood which yield gum. In the month of November the juice begins to exude from the trees. The dry winds which prevail after the rainy season, cause the bark to crack; the juice flows out, and hardens in masses, which are often as large as a pigeon's egg, and sometimes, according to M. Rain, as large as the egg of the ostrich. At this period the Moors and Negroes proceed to the forests in caravans, collect the gum in leather sacs, and convey it to the coast, where they exchange it for British goods. When stowed in the warehouses, it presents the phenomena before noticed in relation to the Barbary gum. The slight odour at first emitted ceases after a few weeks, and the masses no longer crack when perfectly dry. This variety of gum is imported into the United States chiefly from Bordeaux. It is usually in roundish or oval unbroken pieces, sometimes whitish, but generally yellowish or reddish, or brownish-red, larger than those of the Turkey gum, less brittle and pulverizable, and breaking with a more conchoidal fracture.

Considerable quantities of gum are imported into this country from India. Ainslie states that it is derived from the *A. Arabica;* and it is not improbable that much of it is taken to Calcutta in the Arab vessels from the ports of the Red Sea. It is in pieces of various size, colour, and quality, some resembling the broken fragments of the Turkey gum, though much less chinky; others large, roundish, and tenacious, like the Senegal. Its taste is sweeter than that of the other varieties. It is usually much contaminated, containing, besides the genuine gum Arabic, portions of a different kind of gum, having the characteristic properties of that known by the name of Bassora. This is distinguished by its insolubility in water, with which, however, it unites, swelling up, and forming a soft viscid mass. It owes its properties to the presence of bassorin. The pieces of this gum bear a considerable resemblance to those of the genuine article, and may easily escape detection. Their want of solubility, however, is a ready test. More or less of a similar substance is found in the parcels of gum Arabic from other sources; and we have seen some said to have come from Barbary, chiefly composed of it. Besides this impurity in the India gum, there are often others more readily detected. Among these, we have observed a yellowish-white resinous substance, which has the sensible properties of the turpentines. If proper care be used in assorting this commercial variety, it may be employed for all the purposes of good gum Arabic. The *India gum* is brought into this country partly from Calcutta, partly by way of England. It usually comes in large cases. We have seen a parcel of gum said to have come directly from the Red Sea, enclosed in large sacs made of a kind of matting, and bearing a close resemblance to the gum from Calcutta, except that it was more impure, and contained numerous large, irregular, very brittle masses, not much less than the fist in size.

In consequence of the presence of impurities, and of the difference in its quality, gum Arabic should generally be assorted for pharmaceutical use.

General Properties. Gum Arabic is in roundish or amorphous pieces, or irregular fragments of various sizes, more or less transparent, hard, brittle, pulverizable, and breaking with a shining fracture. It is usually white, or yellowish-white; but frequently presents various shades of red, and is sometimes of a deep orange or brownish colour. It is bleached by exposure to the light of the sun. In powder it is always more or less purely white. It is inodorous, has a very feeble slightly sweetish taste, and when pure, dissolves wholly away in the mouth. The specific gravity varies from 1.31 to 1.48. (*Berzelius.*) Gum Arabic consists essentially of a peculiar proximate principle of plants usually called *gum*, but for which the name of *arabin*,* originally proposed by Chevreul, has been recently adopted by the French chemists. In describing its chemical relations, therefore, we describe those of the principle alluded to. Water, either cold or hot, dissolves it, and forms a viscid solution called mucilage, which when evaporated, yields the gum unchanged. (See *Mucilago Acaciæ.*) It is insoluble in alcohol, ether, and the oils; and alcohol precipitates it from its aqueous solution. The diluted acids dissolve it, but not more freely than water. The concentrated acids decompose it. Triturated with sulphuric acid, at ordinary temperatures, it is converted into a substance similar to the gummy product which results from the action of the same acid on linen rags or saw-dust. Heated with concentrated sulphuric acid, it is decomposed, with the evolution of carbon. The diluted acid, when boiled with it, gives rise to the formation of a saccharine substance. Strong nitric acid converts it into mucic acid, and at the same time produces oxalic and malic acids. It combines with several of the salifiable bases. With the alkalies and earths it forms soluble compounds. By the subacetate of lead it is precipitated from its solution, in the form of a white insoluble compound of gum and protoxide of lead; and a delicate test of its presence in any liquid is thus afforded. It enters into combination with several salts. A solution of borax coagulates it. When added to a solution of silicate of potassa, it precipitates a compound of gum, potassa, and silica, while a compound of gum and potassa remains dissolved. It is distinguished from other gums by affording a yellow or orange precipitate with the solution of persulphate of iron, and a precipitate insoluble in nitric acid, with even a dilute solution of the permuriate of iron. (*Berzelius.*) In solution, it unites with sugar; and the liquid, when evaporated, yields a transparent, solid substance, which is not susceptible of crystallization.

Gum Arabic undergoes no change by time when kept in a dry place. Its aqueous solution, if strong, remains for a considerable length of time unaltered, but ultimately becomes sour in consequence of the production of acetic acid. At a temperature between 300° and 400°, the gum becomes soft, and may be drawn into threads. At a red heat it is decomposed, yielding, among other substances, a minute proportion of ammonia. When burnt, it leaves about three per cent. of ashes, consisting, according to Guérin, of the carbonates of potassa and of lime, a little phosphate of lime, chloride of potassium, oxide of iron, alumina, magnesia, and silica. The lime exists in the gum combined with an excess of malic acid, which gives to its solution the property of reddening litmus paper. Besides pure gum or arabin, gum Arabic contains a very small proportion of some azotized body, several saline substances, and a considerable quantity of uncombined water, amounting, according to Guérin, to 16 or 17 per cent. Pure gum may be obtained by treating the compound of gum and protoxide of lead with sulphuretted hydrogen. Its constituents, according to Gay-Lussac and Thenard, are carbon 42.23, oxygen 50.84, and hydrogen 6.93; or carbon 42.23, and water 57.77; and this result accords very closely with that obtained by Berzelius. The analysis of Guérin is somewhat different, from the circumstance that he succeeded in depriving the gum more thoroughly of moisture.

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* Much confusion has existed in the use of the word *gum*, which has been employed to express various concrete vegetable juices, and, at the same time, a peculiar proximate principle of plants. It is now proposed to restrict the term to the former of these applications, and to designate the principle alluded to by a distinct name. Within a few years the subject of the gums has been investigated by M. Guérin, who has repeated and corrected the experiments of former chemists, and thrown new light upon the nature of these substances. Several of the facts mentioned in the text have been derived from his memoir, published in the *An. de Chim. et de Phys.* t. XLIX. p. 248. M. Guérin considers as characteristic of gums, the property of affording mucic acid, when acted on by nitric acid. He recognizes in the different gums three distinct proximate principles; namely, 1. *arabin*, or the pure gum of chemical writers, which is the essential constituent of gum Arabic in all its varieties; 2. *bassorin*, which enters largely into the composition of Bassora gum and tragacanth; and 3. *cerasin*, which constitutes the portion of cherry gum insoluble in cold water. Of arabin sufficient is said in the text. Bassorin will be treated of under the the head of Bassora gum. Of *cerasin* it may be proper to say a few words in this place. The gums which exude from the cherry, apricot, peach, and plum trees, and which the French call *gomme du pays*, appear to be identical in composition, consisting of a portion soluble in cold water, which is arabin, and a portion insoluble, which was formerly thought to be the same with bassorin, but has been proved by M. Guérin to be different, and is appropriately denominated cerasin. This principle is colourless, semitransparent, tasteless, inodorous, uncrystallizable, insoluble in alcohol, insoluble in cold water, in which it softens and swells a little, and convertible by the action of boiling water into arabin, with which it appears to be isomeric. In this last property it differs materially from bassorin, which is not changed by boiling water. M. Guérin suggests that the natural heat of the climate in tropical countries produces the same effect upon the exuded gums as artificial heat in colder regions, and that consequently the acacia gum consists chiefly of arabin.

The properties above described belong to gum Arabic generally. There are, however, pharmaceutic varieties differing from each other to a degree and in a manner which deserve notice. 1. *Gum that is transparent and readily soluble.* This constitutes by far the greater portion of the commercial varieties distinguished by the names of Turkey gum and gum Senegal. It is characterized by its transparency, ready solubility, and the comparatively slight degree of thickness and viscidity of its solution. Under this head may be included the *gomme blanche fendillée* of Guibourt, and other French writers. It is distinguished by the whiteness and deficient transparency of the pieces, attributable to the minute cracks or fissures with which they abound, and which render them very brittle and easily pulverizable. This peculiar structure is generally ascribed to the influence of solar heat and light; but is conjectured by Hayne to arise from the exudation of the juice in the frothy state noticed by Ehrenberg. Though the pieces are somewhat opaque, each of the minute fragments into which they may be broken is perfectly transparent and homogeneous. This variety, in consequence of its prompt and entire solubility, is usually preferred for medical use, and for most purposes in pharmacy. 2. *Gum less transparent and less soluble.* Guibourt has proposed for this variety the name of *gomme pelliculée*, from the circumstance that the masses are always apparently covered, on some part of their surface, by a yellowish opaque pellicle. Its transparency is less perfect than that of the former variety; it is less quickly and less completely dissolved by water, and forms a more viscid solution. It melts with difficulty in the mouth, and adheres tenaciously to the teeth. It is found in all the commercial varieties of gum, but least in that from Egypt. In Europe it is frequently called *gum Gedda.* Between these two varieties of gum there are insensible gradations, so that it would be difficult always to classify the specimens which may come under notice.

Medical Properties and Uses. This gum is used in medicine, chiefly as a demulcent. By the viscidity of its solution, it serves to cover and sheathe inflamed surfaces; and by blending with and diluting irritating matters, tends to blunt their acrimony. Hence it is advantageously employed in catarrhal affections and irritation of the fauces, by being held in the mouth and allowed slowly to dissolve. Internally administered it has been found especially useful in inflammatory affections of the gastric and intestinal mucous membrane; and its employment has even been extended to similar affections of the lungs and urinary organs. Whether it is beneficial in the latter cases in any other manner than by the dilution resulting from its watery vehicle, is a doubtful point. By some physicians it is thought to possess a positively sedative influence over the action of inflamed surfaces to which it is applied in the state of solution. As an article of diet in febrile cases, and others requiring an adherence to a very rigid regimen, it is perhaps superior to almost any other substance. If not positively sedative, it is certainly not in the least irritating, while it is sufficiently nourishing to prevent the injurious action of the organs upon themselves. Its nutritive properties have been denied; but the fact of their existence rests on incontrovertible evidence. The Moors and Negroes live on it almost exclusively during the period of its collection and conveyance to market; the Bushmen Hottentots, in times of scarcity, support themselves upon it for days together; and we are told that the apes of South Africa are very fond of it. Six ounces a day are said to be sufficient to sustain life in a healthy adult. In many cases of disease, its solution may with propriety constitute the exclusive drink and food of the patient. It is best prepared by dissolving an ounce of the gum in a pint of boiling water, and allowing the solution to cool. In pharmacy, gum Arabic is extensively used for the suspension of insoluble substances in water, and for the formation of pills and troches.

Off. Prep. Emulsio Acaciæ Arabicæ, *Ed.*, *Dub.;* Mucilago Acaciæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Pulvis Cretæ Compositus, *Lond.*, *Dub.;* Pulvis Tragacanthæ Compositus, *Lond.;* Syrupus Acaciæ, *U.S.;* Trochisci Gummosi, *Ed.* W.

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ACETOSÆ FOLIA. *Lond.*

Sorrel Leaves.

"Rumex Acetosa. *Folia.*" *Lond.*

Off. Syn. RUMICIS ACETOSÆ FOLIA, *Ed.;* RUMEX ACETOSA. Folia. *Dub.*

Oseille des jardins, *Fr.;* Sauerampfer, *Germ.;* Acetosa, *Ital.;* Azedera, *Span.*

Rumex. See RUMEX AQUATICUS.

Several species of Rumex have acid leaves, and are distinguished by the common name of *sorrel* from the others which are called *dock*. Two only deserve particular notice, the *R. Acetosa*, or common English sorrel, which is sometimes cultivated in our gardens, and the *R. Acetosella*, or common sorrel of our fields.

Rumex Acetosa. Willd. *Sp. Plant.* ii. 260.; Woodv. *Med. Bot.* p. 660. t. 230. This is a perennial herbaceous plant, with a striated leafy stem, branching at top, and rising one or two feet in height. The radical leaves are narrow, oblong, arrow-shaped, and supported on long foot-stalks; those attached to the stem are alternate, pointed, and clasping. The flowers are diœcious, in terminal panicles, and partly tinged of a red colour.

R. Acetosella. Willd. *Sp. Plant.* ii. 260.; *Eng. Bot.* 1574. The common field sorrel is also an herbaceous perennial, with a stem from four to twelve inches high, and lanceolate-hastate leaves, having the lobes spreading or recurved. The male and female flowers are on separate plants. The valves are without grains. The flowers appear in May, June, and July. Though abundant in the light sandy or gravelly soils of this country, it is supposed by some botanists to have been introduced from Europe.

Sorrel leaves are pleasantly sour, and without odour. Their acidity is dependent on the presence of binoxalate of potassa, with a small proportion of tartaric acid. Starch and mucilage are also among their constituents. Their taste is almost entirely destroyed by drying.

They are refrigerant and diuretic, and may be used with great advantage, as an article of diet, in scorbutic complaints. They are prepared in the form of salad, or boiled like spinage. The juice of the fresh leaves forms with water a pleasant acidulous drink, sometimes given in fevers. W.

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ACETOSELLA. *Lond.*

Wood-sorrel.

"Oxalis Acetosella." *Lond.*

Oseille de bucheron, Surelle, *Fr.;* Sauerklee, *Germ.;* Alleluja, *Ital.;* Acederilla, *Span.*

Oxalis. *Sex. Syst.* Decandria Pentagynia.—*Nat. Ord.* Oxalideæ.

Gen. Ch. *Calyx* five-leaved. *Petals* five, connected by the claws. *Stamens* unequal, the five shorter exterior ones connected at the base. *Capsules* opening elastically at the corners, five-angled. *Seeds* covered with an arillus. *Pursh.*

Oxalis Acetosella. Willd. *Sp. Plant.* ii. 780.; Woodv. *Med. Bot.* p. 563. t. 201. The wood-sorrel is a small perennial, herbaceous, stemless plant, with numerous radical leaves, which are all ternate, and supported upon slender hairy petioles. The leaflets are obcordate, entire, hairy, of a yellowish-green colour, but frequently purplish on their under surface. The scape or flower-stalk, which usually exceeds the petioles in length, is furnished with two scaly bractes near the middle, and terminates in a large white, or flesh-coloured flower, marked with red streaks. The styles are of the same length with the inner stamens.

This plant is a native both of Europe and N. America. In this country it is found chiefly in the mountainous regions of the interior. It selects shady places, such as woods, groves, and hedges; and flowers in May. Other indigenous species of Oxalis, more widely diffused than the *O. Acetosella,* might be substituted for it without disadvantage, as they possess similar properties. They all have ternate leaves with obcordate leaflets, and, with the single exception of the *O. violacea,* bear yellow flowers. The whole herbaceous portion may be used.

Properties. Wood-sorrel is without smell, and has a pleasant sour taste. It owes its acidity to the *binoxalate of potassa,* which is separated for use, and sometimes sold in the shops under the name of the *salt of sorrel.* In England it is mixed with a considerable proportion of bitartrate of potassa, and sold as the *essential salt of lemons.* It comes from Switzerland and Germany, where it is prepared from different species of Oxalis and Rumex. The following process is employed. The plants previously bruised are macerated for some days in water, and then submitted to pressure. The liquid thus obtained is mixed with clay and occasionally agitated for two days. At the end of this time, the clear liquor is decanted, and evaporated so that crystals may form when it cools. These are purified by solution and a new crystallization. Five hundred parts of the plant afford four parts of the acidulous salt. The same salt may be prepared by cautiously dropping a solution of potassa into a saturated solution of oxalic acid. The binoxalate crystallizes when a sufficient quantity of the alkali has been added. It is in rhomboidal crystals, of a sour pungent bitterish taste, soluble in ten times their weight of boiling water, much less so in cold water, and unalterable in the air. It is employed for removing iron mould and ink stains from linen, and sometimes as a test for lime. It contains 72.48 parts or two equivalents of oxalic acid, 47.5 parts or one equivalent of potassa, and 18 parts or two equivalents of water.

Medical Properties. This and other species of sorrel are refrigerant; and their infusion, or a whey made by boiling them in milk, may be used as a pleasant drink in febrile and inflammatory affections. A solution of the binoxalate of potassa is used on the continent of Europe as a substitute for lemonade. The fresh plant, eaten raw, is said to be useful in scorbutic cases. W.

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ACETUM. *U. S., Lond., Ed.*

Vinegar.

Off. Syn. ACETUM VINI. *Dub.*

Vinaigre, *Fr.;* Essig, *Germ.;* Aceto, *Ital.;* Vinagre, *Span.*

Vinegar is a sour liquid, the product of a peculiar fermentation called acetous. Viewed chemically, it is a very dilute solution of acetic acid, containing foreign matters. (See *Acidum Aceticum.*)

The acetous fermentation can be induced in all liquors which have undergone or are susceptible of the vinous fermentation. Thus sugar and water, saccharine vegetable juices, infusion of malt, cider, and wine, may be converted into vinegar, if subjected to the action of a ferment, and exposed, with access of air, to a temperature between 75° and 90°.

In different countries, different liquors are used for conversion into vinegar. In France and other wine countries, wine is employed; in Britain, infusion of malt; and in the United States, for the most part, cider. For the use of the white lead manufacturer, it has, of latter years, been extensively made from potatoes.

The method pursued in making wine vinegar at Orleans, in France, where it is manufactured in the greatest perfection, is as follows. Casks are employed of about the capacity of 88 wine gallons, those being preferred which have been previously used for a similar purpose. They are placed upright in three rows, one above another; each cask having an opening at the top of about two inches in diameter. In summer, no artificial heat is used; but in winter, the temperature of the manufactory is maintained at about 68°. The wine intended to be converted into vinegar is kept in separate casks, containing beech shavings, on which the lees are deposited. Twenty-two gallons of good vinegar, boiling hot, are first introduced into each vinegar cask, and at the end of eight days, about two gallons of the wine, drawn off clear, are added; and the same quantity is added every eight days, until the casks are full. After this, the vinegar takes about fifteen days to form. At the end of this time, only half the contents of each cask is drawn off; and it is filled up again by the addition of two gallons of wine every eight days as at first. In some cases, however, the quantity of wine added, and the intervals between the successive additions, are greater or less than those here indicated; the variations in this respect depending upon the progress of the fermentation. To determine this point, the vinegar makers plunge a stave into the cask; and if, upon withdrawing it, they find it covered with froth, they judge that the fermentation is going on properly, and, accordingly, add more wine.

Two sorts of wine vinegar occur in commerce, the white and the red; the former being derived from the acetification of white, the latter, of red wine. Red vinegar, however, may be deprived of its colour and rendered limpid, by being passed repeatedly through animal charcoal.

When the infusion of malt is employed, the process is as follows. The infusion, when properly cooled, is put into large and deep fermenting tuns, where it is mixed with yeast, and kept in fermentation for four or five days. The liquor is now distributed into smaller vessels, placed in a room heated by means of a stove, and kept there for about six weeks, or until the whole is soured. It is then transferred to common barrels, which are placed in the open air, the bung-holes being simply covered with a tile to keep out the rain; in which situation they are allowed to remain for four or five months, or until perfect vinegar has formed. The process is then completed in the following manner. Large tuns are prepared, with false bottoms, on which is put a quantity of the refuse of raisins and other fruit, technically called *rape*. These tuns are worked in pairs, one being completely filled with the vinegar from the barrels, and the other only three-fourths filled. In the latter, the fermentation takes place most readily; and the process is rendered more active alternately in one or the other tun, by filling up each daily from the other, until the process is completed.

In the United States, cider is the principal liquid from which vinegar is prepared. In families, it is made from cider which has become too sour, and from the daily remains of the family consumption. These are put into the vinegar barrel, in a warm place, along with some good vinegar, or with what is called the *mother of vinegar*, that is, the peculiar gelatinous coagulum which forms in this liquid during the progress of the acetous fermentation, and which acts as the ferment. In a few weeks the vinegar will be formed.

When vinegar is made on a large scale from cider, the liquor is placed in barrels with their bung-holes open, which are exposed during the summer to the heat of the sun. The acetification is completed in the course of about two years. The progress of the fermentation, however, must be watched; and as soon as perfect vinegar has formed, it should be racked off into clean barrels. Without this precaution, the acetous fermentation would be followed by the putrefactive, and the whole of the vinegar be spoiled. The early cider is not so good for conversion into vinegar as the late, in consequence of the abundance of malic acid which the former contains; for it must be recollected, that in cider, the malic acid is not the subject matter of the acetous fermentation, but the alcohol which it contains as a vinous liquor.

Vinegar may be clarified, without injuring its aroma, by throwing about a tumbler full of boiling milk into from fifty to sixty wine gallons of the liquid, and stirring the mixture. This operation has the effect, at the same time, of rendering red vinegar pale.

The changes which occur during the acetous fermentation, are not well understood. During its progress, there is a slight disengagement of heat; the liquor absorbs oxygen, becomes turbid, and filaments form, which are observed to move in various directions, until, finally, the fermentation being completed, they are deposited in a mass of a pultaceous consistence. The liquor now becomes transparent, its alcohol is found to have disappeared, and acetic acid to have formed in its place. How then is this change of alcohol into acetic acid effected? From a comparison of the ultimate composition of these two substances, Berzelius supposes that one equivalent of alcohol, absorbs four equivalents of oxygen, three of which are expended in forming water with three equivalents of hydrogen in the alcohol, while the fourth enters into the composition of the acetic acid produced. In this way four equivalents of carbon, six of hydrogen, and two of oxygen (alcohol,) become four equiv. of carbon, three of hydrogen, and three of oxygen (acetic acid.) The carbonic acid, observed to be generated by De Saussure during the acetous fermentation, is considered by Berzelius as a product not of that process, but of the vinous fermentation simultaneously taking place in the liquid, in consequence of the presence of sugar.

It is known with certainty, that alcohol, either pure, or simply diluted with water, will never undergo the acetous fermentation; but if it be properly reduced with water, and mixed with yeast, or some other ferment, acetification will take place. According to Chaptal, if two pints of brandy be carefully mixed with about four drachms of yeast, and a little starch, there will be produced an extremely strong vinegar, which will begin to form about the fifteenth day. Vinegar may also be made by means of the starch and ferment mixed with water, without the alcoholic liquor; but in this case the process will be longer, and the product much weaker.

Acetic acid is not produced exclusively by the acetous fermentation. Thus it is found that sugar, mixed with water in which the gluten of wheat has fermented, will be converted into vinegar, without access of air, and without any appearance of fermentation. The infusion of malt, provided sufficient hops have not been added, becomes sour in the course of a few days; and the same is the case with beer and cider if long kept.

Properties. Vinegar, when good, is of an agreeable penetrating odour, and pleasant acid taste. Its colour varies from pale yellow to deep red. When long kept, particularly if exposed to the air, it becomes muddy and ropy, acquires an unpleasant smell, putrefies, and loses its acidity. This result may, in a good measure, be prevented by boiling it for a few minutes, so as to coagulate and separate the gluten, and immediately transferring it to bottles, which must be well corked.

The essential parts of vinegar are *acetic acid* and *water*, in the proportion of about five parts of the former to ninety-five of the latter; but besides these it contains various other substances, derived from the particular vinous liquor from which it may have been prepared. Among these may be mentioned, colouring matter, gum, starch, gluten, sugar, a little alcohol, and frequently malic and tartaric acid, with minute portions of alkaline and earthy salts. It is sometimes intentionally adulterated with sulphuric, muriatic, or nitric acid. Sulphuric acid may be detected by acetate of baryta, which throws down sulphate of baryta, distinguishable from the malate and tartrate of the same base by its insolubility in nitric acid. Muriatic acid is shown by a precipitate being formed by nitrate of silver, insoluble in nitric acid, but perfectly soluble in water of ammonia. To detect nitric acid, add a little common salt, saturate by adding carbonate of potassa, and evaporate to dryness. Upon the dry residue, pour equal parts of sulphuric acid and water, through which some gold leaf has been diffused, and boil the mixture. If nitric acid be present, nitro-muriatic acid will be generated, in consequence of the decomposition of the common salt, and the gold leaf will be dissolved.

English malt vinegar always contains sulphuric acid. According to Mr. Phillips, the strongest vinegar of this kind is called *proof vinegar*, and is distinguished by the manufacturer as No. 34. It is estimated to contain five per cent. of real acid, and the maker is allowed to mix with it one-thousandth of its weight of sulphuric acid. In testing this vinegar for impurities, allowance should be made for this proportion of sulphuric acid, equivalent to one grain and a fifth of sulphate of baryta to the fluidounce.

Sometimes grains of paradise, spurge flax, capsicum, or pellitory of Spain, are added to vinegar to give it more pungency. When present, they can be detected by the taste.

Vinegar is rendered aromatic by various additions; such as citron, thyme, and rosemary. Henry's aromatic vinegar is an acetic solution of camphor, and of the oils of cloves, lavender, and rosemary. The Edinburgh College have a preparation of this kind under the name of *Acidum Aceticum Aromaticum*, to which head the reader is referred.

Medical Properties. Vinegar acts as a refrigerant and diuretic. With this view, it is added to diluent drinks in inflammatory fevers. It is useful in affections of the urinary organs, attended with a white deposition from the urine, consisting of phosphate of lime and phosphate of magnesia and ammonia. It is sometimes used as a clyster, diluted with twice or thrice its bulk of water. It has been supposed to be a powerful antidote to the narcotic poisons, but this is a mistake. In the case of opium the best authorities unite in considering it worse than useless, as it rather gives activity to the poison than neutralizes it. Externally it is employed as a fomentation or lotion in bruises and sprains. Diluted with water, it forms the best means of clearing the eye from small particles of lime. Its vapour is inhaled in certain states of sorethroat; and is diffused through sick rooms under the impression that it neutralizes pestilential effluvia, though in fact it has no other effect than to cover unpleasant smells. The dose is from one to four fluidrachms; as a clyster from one to two fluidounces.

Off. Prep. Acetum Destillatum, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Cataplasma Sinapis, *Lond.*, *Dub.;* Ceratum Saponis, *U.S.*, *Lond.;* Emplastrum Ammoniaci, *U.S,;* Linimentum Æruginis, *Lond.;* Tinctura Opii Acetata, *U.S.* B.

ACIDUM ACETICUM EMPYREUMATICUM. *U.S.*

Pyroligneous Acid.

"Acidum aceticum impurum, ex ligno destillatum. *Impure acetic acid, obtained from wood by distillation.*" *U.S.*

Acide pyro-ligneux, *Fr.;* Brenzliche Holzsäure, *Germ.;* Acido pyrolignico, *Ital.*

This is the impure acetic acid obtained from wood by destructive distillation in close vessels. Wood, when charred, yields many volatile products, among which are an acid liquor, empyreumatic oil, and tar containing creosote and some other newly discovered proximate principles. When the carbonization is performed in close vessels, these products, which are lost in the ordinary process of charring, may be collected, and at the same time, a larger amount of charcoal obtained. The acid liquor, when freed as far as possible by rest from the tar and oil, is the pyroligneous acid.

Carbonization in close vessels, with a view to preserve the volatile products, was first put in practice by Mollerat at Nuits in France. The apparatus employed at Choisy, near Paris, is thus described by Thenard. It consists of, 1st, a furnace with a moveable top; 2d, a strong sheet-iron cylinder, sufficiently capacious to contain a cord of wood, and furnished with a sheet-iron cover; 3d, a sheet-iron tube proceeding horizontally from the upper and lateral part of the cylinder to the distance of about a foot; 4th, a copper tube connected with the last, which is bent in such a manner as to plunge successively to the bottom of two casks filled with water, and after rising out of the second, is then bent back, and made to terminate in the furnace. At the bottom of each cask, the tube dilates into a ball, from the under part of which another tube proceeds, which, passing water-tight through the cask, terminates over a vessel, intended to receive the condensible products.

The sheet-iron cylinder, being filled with wood, and closed by luting on its cover with fire-clay, is let down into the furnace by the help of a crane. The fire is then applied, and when the process is completed, the cylinder is removed by the same means, to be replaced by another. During the carbonization, the volatile products pass off by the tube; and those which are condensible, being the pyroligneous acid and tar, are condensed by the water in the casks, and collect in the lower bends of the tubes, from which they run into the several recipients; while the incondensible products, being inflammable gases, are emitted finally in the furnace, where, by their combustion, they assist in maintaining the heat. Eight hundred pounds of wood afford, on an average, thirty-five gallons of crude acid, weighing about three hundred pounds.

Properties. Pyroligneous acid is a brown transparent liquid, having a strong smoky smell. It consists essentially of acetic acid, diluted with more or less water, and holding in solution tar and empyreumatic oil. It may be purified by chemical means, and furnishes a strong acetic acid, which is officinal with the London College under the name of *Acidum Aceticum Fortius.* In its purified state it is sometimes used in the manufacture of white lead. In the extensive lead works of the Messrs. Lewis, of Philadelphia, pyroligneous acid is made on a large scale, after the French method, with a view to its subsequent purification and employment in the manufacture of this article.

Medical and Economical Properties. Pyroligneous acid, in a dilute state, has been used as an application to gangrene, and ill-conditioned ulcers. It acts on the principle of an antiseptic and stimulant, the former property being probably due to the presence of creosote. Several cases in which it was successfully employed, are reported in a paper by Dr. T. Y. Simons, of Charleston, S. C. published in the fifth volume of the American Journal of Medical Sciences.

This acid is advantageously applicable to the preservation of animal food. Mr. William Ramsay, (*Edin. Phil. Journ.* iii. 21.) has made some interesting experiments on its use for this purpose. Herrings and other fish, simply dipped in the acid and afterwards dried in the shade, were effectually preserved, and when eaten, were found very agreeable to the taste. Herrings slightly cured with salt, by being sprinkled with it for six hours, then drained, next immersed in pyroligneous acid for a few seconds, and afterwards dried in the shade for two months, were found by Mr. Ramsay to be of fine quality and flavour. Fresh beef, dipped in the acid in the summer season for the short space of a minute, was perfectly sweet in the following spring. Professor Silliman states, that one quart of the acid added to the common pickle for a barrel of hams, at the time they are laid down, will impart to them the smoked flavour as perfectly as if they had undergone the common process of smoking. B.

ACIDUM ARSENIOSUM. *U.S.*

Arsenious Acid.

Off. Syn. ARSENICUM ALBUM. *Lond.;* OXIDUM ARSENICI, *Ed.;* ARSENICI OXYDUM ALBUM. *Dub.*

White Arsenic; Acide arsenieux, Arsenic blanc, *Fr.;* Arsenichte Säure, Weisser Arsenik, *Germ.;* Arsenik, *Dan.*, *Swed.*, *Polish;* Acido arsenioso, Arsenico, *Ital.;* Arsenico blanco, *Span.*

The basis of all the arsenical preparations is a peculiar metal called arsenic. It is brittle and of a steel-gray colour, and possesses much brilliancy when recently broken or sublimed. Exposed to the air, its surface becomes dull and blackens. Its texture is granular, and sometimes a little scaly. Rubbed in the hands it communicates a peculiar odour, but it is devoid of taste. Its sp. gr. is 5.7 according to Berzelius, 5.9 according to Guibourt. When heated to about 356° of Fahr. (*Berzelius*) it sublimes without fusing, giving rise to vapours having an alliaceous or garlicky odour. Its subliming point is differently stated by Dr. J. K. Mitchell and Mr. Durand. According to these experimenters, this point is as high as a red heat visible in the dark. (*Journ. Phil. Col. of Pharm.* iv. 108. *July*, 1832.) Its equivalent number is 37.7.

Arsenic forms two well characterized combinations with oxygen, both having acid properties, called *arsenious* and *arsenic acid*.

Preparation, &c. Arsenious acid is prepared chiefly in Bohemia and Saxony, where it is procured on a large scale, as a collateral product, during the smelting of cobalt ores, which are almost invariably accompanied by arsenic. These ores are roasted in reverberatory furnaces, with long horizontal flues. The arsenic is converted, by combustion, into arsenious acid, which sublimes and condenses on the sides of the flues. In this state it is not pure, and requires a second sublimation, which is performed in cast iron vessels, fitted with conical heads of the same material, having an opening at the summit. The vessels are placed over a furnace, and brought to a red heat, when a portion of the impure arsenious acid is thrown in through the opening, which is immediately stopped. This portion being sublimed, a new portion is introduced in a similar manner. Finally the vessels are allowed to cool, and the heads being removed, the purified acid is found attached to them in vitreous layers, at first as transparent as glass, but gradually becoming, by contact with the air, opaque at their surface. These are broken up in fragments of a convenient size, and thrown into commerce. The arsenious acid which reaches this country is generally packed in casks, containing from two to five hundred pounds, and is shipped principally from the ports of Hamburg and Bremen.

Properties. Arsenious acid, as it occurs in commerce, is in masses exhibiting a vitreous fracture. It is of a milk-white colour exteriorly, but internally, perfectly transparent. As first sublimed, the whole mass is transparent, but it gradually becomes white and opaque, the change proceeding progressively from the surface inwards. The nature of this change has not been well determined. According to Guibourt, the sp. gr. of the transparent variety is 3.73; that of the opaque, 3.69. The experiments, however, of Dr. Mitchell and Mr. Durand make the density of the former variety from 3.208 to 3.333. As it occurs in the shops for medicinal use, it is in the form of a white powder, almost as fine as flour. In this state it is sometimes adulterated with powdered chalk, or sulphate of lime, a fraud which is easily detected by exposing the powder to a heat sufficient to evaporate the arsenious acid, when these impurities will be left behind. It is erroneously stated to have an acrid taste. Dr. Christison asserts that it possesses hardly any taste, inasmuch as it produces merely a faint sweetish impression on the palate. In strong, hot solution, it has an austere taste, most nearly resembling that of sulphate of zinc. (*Mitchell and Durand.*) It has no smell even when in a state of vapour; as the garlicky odour, which is sometimes attributed to it, belongs only to the vapours of the metal; and when apparently arising from the acid itself, is, in fact, owing to its reduction. Its point of sublimation, according to Berzelius, is at an incipient red heat; but according to Mitchell and Durand, it is lower instead of higher than that of metallic arsenic, being only 425° of Fahr. When sublimed slowly, it condenses in regular octohedral crystals, exhibiting a strong lustre. It consists of two equivalents of arsenic 75.4, and three equivalents of oxygen $24=99.4$.

Arsenious acid is soluble in water. Guibourt states that its solubility differs according as it is transparent or opaque. Thus 1000 parts of water at 69° Fahr. dissolve 9.6 of the transparent, and 12.5 of the opaque variety; and the same quantity of boiling water dissolves 97 parts of the transparent, retaining 18 when cold, and 115 parts of the opaque, retaining 29 on cooling. These results show that a boiling saturated solution, when allowed to cool, retains more of the acid in solution, than can be dissolved in cold water without a preliminary boiling, and teach the propriety of employing a boiling temperature when searching for this mineral. The solubility of the powder of arsenious acid, as prepared for use in medicine, corresponds, of course, with that of the opaque variety.

Medical Properties. Internally, the action of the preparations of arsenic is alterative and febrifuge; externally, for the most part, violently irritant. They have been considered as peculiarly applicable to the treatment of diseases of a periodical character. When commencing their exhibition, the dose should be small, and afterwards gradually increased, its operation being carefully watched. When the specific effects of the medicine are produced, it must be immediately laid aside. These are, a general disposition to œdema, especially of the face and eyelids, a feeling of stiffness in these parts, itching of the skin, tenderness of the mouth, loss of appetite, and uneasiness and sickness of the stomach. The peculiar swelling produced is called *œdema arsenicalis.* The principal preparations now in use are the arsenious acid, the article under consideration, and the solution of arsenite of potassa, or Fowler's solution. The arseniates of potassa and soda, and the sulphuret of arsenic are also occasionally employed. One grain of the arseniate of soda, dissolved in a fluidounce of water, forms the *arsenical solution of Pearson.*

It may be a question whether the different arsenical preparations act precisely in the same way, when exhibited internally. It is supposed by some, that the selection need only be regulated by the convenience for exhibition. Dr. Physick, whose opinion is entitled to great respect, thinks otherwise; for, with regard to the arsenious acid, and the solution of arsenite of potassa, (Fowler's solution,) the result of his experience is, that they act differently, and cannot be substituted for one another.

Some writers have entirely proscribed the use of the arsenical preparations in medicine. Amongst these, one of the most authoritative is Mr. Brande, who considers their introduction into the Pharmacopœias a great evil, as affording facilities, by legalizing the medicinal use of the poison, for its employment for self-destruction and murder. At the same time he believes that more harm than benefit has resulted from its administration. (*Man. of Pharm.* p. 29.) We confess, however, that we do not share these opinions with Mr. Brande. Arsenic is confessedly a virulent poison, and is frequently employed for criminal purposes; but when it is considered how extensively it is used in the arts, it is questionable whether its exclusion from the materia medica would much lessen the facility of obtaining it. On the other hand, it may be asked, are poisons more dangerous as medicines than other medicinal substances, if given in their appropriate doses? We should think not; though we freely acknowledge, that dangerous mistakes in the dose are more apt to occur. If the views of Mr. Brande were carried out, they would lead to the discarding of the corrosive chloride of mercury, hydrocyanic acid, strychnia, and other articles from the materia medica; but we believe that no practitioner will be found willing to strike these substances from the list of remedies.

While we wish to retain arsenic as a potent remedy in the hands of the judicious practitioner, we should be glad to find the public authorities in the United States subjecting the sale of this poison to strict regulations, under heavy penalties for their infraction. Speaking of the practice in Europe, Berzelius remarks, "Le commerce de l'acide arsénieux est toujours soumis a une surveillance sévère, et l'achat n'en est permis qu'a ceux, qui ont donné des preuves légales qu'il leur est indispensable dans l'exercise de leur état. A l'exception de ces cas, l'acheteur et le vendeur sont soumis a une responsabilité très sévère." (*Traité de Chimie*, ii. 431.)

Arsenic has been exhibited in a great variety of diseases, the principal of which are scirrhus and cancer, especially cancer of the lip; anomalous ulcers; intermittent fever; chronic rheumatism, particularly that form of it attended with pains in the bones; diseases of the bones, especially nodes; frontal neuralgia; and different painful affections of the head, known under the names of hemicrania and periodical headache. It has been extolled as a remedy in certain cutaneous affections, particularly lepra. Cases of its efficacy in several of these diseases will be mentioned here, while its effects in other complaints will be noticed under the article *Liquor Potassæ Arsenitis*, to which the reader is referred. Its external application has been principally restricted to cancer, and anomalous and malignant ulcers, especially of that kind denominated *noli me tangere*. For a complete list of the diseases in which arsenic has been tried, the reader is referred to Mr. Hill's paper in the Edin. Med. Journal, vols. v. and vi.

Justamond considered arsenic as a specific in cancer, but subsequent experience has not justified his opinion. This metal, however, is thought highly of by many practitioners in cases of lupus, and ill-looking sores of the face, lips, and tongue, and often effects a cure.

Arsenic is the chief ingredient in nearly all the empyrical remedies for the cure of cancer by external application. Plunket's caustic was a secret remedy of this kind, of great celebrity, and consisted of the Ranunculus acris and Ranunculus Flammula, each an ounce, bruised, and mixed with a drachm of arsenious acid, and five scruples of sulphur. The whole was beaten into a paste, formed into balls, and dried in the sun. When used, these balls are rubbed up with yolk of egg, and spread on pig's bladder. The use of the vegetable matter is to destroy the cuticle; for unless this is done, the arsenic will not act. Mr. Samuel Cooper thinks this caustic was never of any permanent benefit in genuine cancer, but has effected perfect cures in some examples of lupus, and malignant ulcers of the lips and roots of the nails.

The late Dr. Rush, (*Trans. Am. Phil. Soc.* ii. 212,) has given an account of the cancer powder of a certain Dr. Hugh Martin, who was surgeon to one of the Pennsylvania regiments during the American Revolution. Dr. Rush had witnessed its application in several cases, and bears testimony to its having performed complete cures in several cancerous ulcers, mostly seated on the nose or cheeks; but where the disease was much connected with the lymphatic system, or with scrofula, it always failed. Upon the death of Dr. Martin, Dr. Rush obtained some of the powder, and having subjected it to analysis, found its active ingredient to be arsenious acid, in the proportion of about one-fortieth of the whole powder. The remainder was vegetable matter, and, in the specimen which Dr. Rush experimented upon, consisted of belladonna. The powder in question gave less pain than the nitrate of silver, and seldom produced an eschar, but only moderate inflammation; the vegetable matter with which the arsenious acid was mixed mitigating the violence of its action. Dr. Martin sometimes touched the ulcers with a feather, dipped in a liquid, which was probably a solution of arsenious acid.

At Paris, an arsenical paste of the following composition is used as an application to malignant ulcers:—Red sulphuret of mercury 70 parts; dragon's blood 22 parts; arsenious acid 8 parts. It is applied, made up into a paste with saliva. The pain produced by this composition is very severe, and its application dangerous. The practice of sprinkling unmixed arsenious acid on ulcers is now reprobated, as fraught with the greatest danger. Mr. S. Cooper characterizes it as a murderous practice. It may, however, be used either in solution, or reduced by some mild ointment. A lotion may be formed with eight grains of arsenious acid and the same quantity of carbonate of potassa, dissolved in four fluidounces of distilled water; and a cerate, with one drachm of arsenious acid and twelve drachms of simple cerate. The arsenic cerate of the U. S. Pharm. is only of half this strength. (See *Ceratum Arsenici.*) The lotion is in effect a solution of arsenite of potassa.

Febure's remedy for cancer consisted of ten grains of arsenious acid dissolved in a pint of distilled water, to which were added an ounce of extractum conii, three fluidounces of liquor plumbi subacetatis, and a fluid drachm of tinct. opii. With this the cancer was washed every morning. Febure's formula for internal exhibition was, arsenious acid two grains; rhubarb half an ounce; syrup of chicory, q. s.; distilled water a pint. Of this mixture, a tablespoonful, which contained about a twelfth of a grain of the acid, was given every night and morning, with half a fluid drachm of the syrup of poppies. The dose was gradually increased to six tablespoonfuls.

Arsenious acid may also be given in pills. A convenient formula is to mix one grain of the acid with ten grains of sugar, and to beat the mixture with crum of bread, so as to form a pilular mass, to be divided into ten pills, one of which is a dose.

Properties of Arsenious Acid as a Poison. Arsenious acid, in an overdose, administered internally, or applied externally, acts with very great energy, and generally destroys life in a short time. The symptoms it produces are an austere taste; fetid state of the mouth; frequent ptyalism; continual hawking; constriction of the pharynx and œsophagus; the sensation of the teeth being on edge; hickups; nausea; anxiety; frequent sinkings; burning pain at the precordia; inflammation of the lips, tongue, palate, throat, and œsophagus; irritable stomach, so as not to be able to support the blandest drinks; vomiting of matters, sometimes brown, at other times bloody; black, horribly fetid stools; pulse small, frequent, concentrated, and irregular, occasionally slow and unequal; palpitations; syncope; insatiable thirst; burning heat over the whole body, or a sensation of icy coldness;

difficult respiration; cold sweats; scanty, red, and bloody urine; change in the countenance; a livid circle round the eye-lids; swelling and itching of the body; livid spots over the surface, and occasionally a miliary eruption; prostration of strength; loss of feeling, especially in the feet and hands; delirium; convulsions, often accompanied with insupportable priapism; falling off of the hair; detachment of the cuticle, &c. It is very rare to observe all these symptoms in the same individual. In some cases, indeed, they are nearly all wanting, death taking place without any pain or prominent symptom. After death, the morbid appearances are various. In some cases, no vestige of lesion can be discovered. The appearances, however, in the generality of cases, are the following. The mouth, stomach, and intestines are inflamed; the stomach and duodenum exhibit spots resembling eschars, and perforations of all their coats; and the villous coat of the former is in a manner destroyed, and reduced to the consistence of a reddish-brown pulp.

Dr. Christison divides the poisonous effects of arsenious acid into three orders of cases, according to the character and violence of the symptoms. In the first order, the poison produces symptoms of irritation and inflammation along the course of the alimentary canal, and commonly kills in from one to three days. In the second, the signs of inflammation are moderate, or even altogether wanting, and death occurs in five or six hours, at a period too early for inflammation to be always fully developed. In the third order of cases, two stages occur, one in which inflammatory symptoms are developed, as in the first order; the other, marked by symptoms referrible to nervous irritation, such as imperfect palsy of the arms or legs, epilepsy, tetanus, hysterical affections, mania, and coma. It is a general character of this poison to induce inflammation of the stomach in almost all instances, provided death does not take place immediately, whatever be the part to which it is applied. Thus the poison, when applied to a fresh wound, will give rise to the same morbid appearances in the stomach and intestines, as when it is swallowed. In some cases, observed by Drs. Mall and Bailie, the rectum was much inflamed, while the colon and small intestines escaped.

The precise rank which should be assigned, in the scale of poisons, to arsenious acid when applied externally, is still undetermined. One set of observers contend that its external application is not attended with great danger, while another party conceives that it acts as a virulent poison. Hunter, Sir Everard Home, Jœger, Brodie, Dr. Campbell of Edinburgh, Smith, and Orfila, have all adduced experiments on the inferior animals, which prove that arsenious acid, inserted into a recent wound, causes death after a longer or shorter period. Indeed, some observations prove that the poisonous effects of the substance are developed in a smaller dose, when used in this way, than when taken into the stomach. Nor are there wanting many well authenticated facts of its deleterious effects on the human constitution. Roux reports the case of a young woman under his care, whose death was caused, after agonizing sufferings, by the application of an arsenical paste to a cancerous breast. Sir Astley Cooper, in his lectures, bears testimony to the dangerous effects of arsenic externally applied. On the other hand, some writers contend for the safety of the external application of this poison. Mr. Blackadder applied it in large quantities to sores, and never witnessed a single instance in which it acted constitutionally. Dr. Randolph of Philadelphia, (*North Amer. Med. and Surg. Journ.* v. 257,) states that Dr. Physick informed him, that though he had frequently and successfully employed arsenic by external application, he had never, in the whole course of his practice, seen it productive of the injurious consequences which have been attributed to it. In weighing such conflicting testimony, we are constrained to believe, that the circumstances of the different experiments and observations must have been different; and we think that the observations of Blackadder and Harles point out in what this difference consists. It seems to depend entirely on the circumstances of the application, as being favourable or unfavourable to absorption. Blackadder attributes his very success to the large quantities of the arsenic which he employs; and which, he contends, kills the part without being absorbed; and this is probably the fact. Harles's observations may be explained on the same principle. He contended that the outward application of arsenic is comparatively safe to ulcers, either common or malignant; but is dangerous to parts recently wounded and pouring out blood. Here the difference would seem to consist in the greater liability to absorption in the latter than in the former case. The very dilution caused by the blood, may be an efficient promoter of absorption, and is entirely consonant with the experiments of Dr. Campbell, who found that arsenic acted with more energy, when dissolved in water, than in the solid state. The case in which Dr. Randolph employed this mineral, by the advice of Dr. Physick, was one of ulcerated scrotum, in which it acted by producing the death of the diseased part, a state evidently unfavourable to absorption. The formula employed was one part of the arsenious acid to five parts of the flowers of sulphur.

Arsenious acid, when it produces the death of a part, does not act, strictly speaking, as an escharotic. It destroys the vitality of the organized structure, and its decomposition is the consequence. The true escharotic acts chemically by decomposing the part to which it is applied, inducing a change incompatible with its life. This distinction being preserved, we can explain why the operation of the arsenious acid is often limited to the destruction of diseased formations, which are known to possess a feeble vitality; while the true escharotics destroy both the diseased and healthy structure. When the arsenious acid succeeds as an external application to cancers, which is a very rare occurrence, it acts on this principle; destroying the vitality of the whole diseased portion, and causing it to be thrown off as something foreign to the system.

Upon the whole, new facts are wanting to clear up this difficult subject. Judging from the lights we possess, the external application of arsenious acid, in case it is absorbed, is attended with very great danger; and the conditions of a part and of the system at large, favourable or otherwise to absorption, are too little understood, to make it warrantable to use this poison externally without the greatest caution.

Treatment of Poisoning by Arsenious Acid. Several antidotes have been recommended for arsenious acid. Magnesia, proposed by Mr. Hume, and charcoal by M. Bertrand, are not found on further observation to be entitled to this character. Three cases are on record of recoveries after the use of large doses of magnesia; but it is more than probable that collateral circumstances contributed to the cure. With regard to charcoal, Orfila has proved, that, whatever may be its powers when swallowed mixed with arsenious acid, it has no effect when taken after the ingestion of the poison. The hydrated peroxide of iron, *freshly* prepared, was announced in 1834 by Dr. Bunsen, of Gottingen, as an antidote for arsenious acid, and its efficacy has been confirmed by MM. Orfila and Lesueur, and MM. Soubeiran and Miquel, by a number of experiments on inferior animals. It acts by producing with the poison, the insoluble, and therefore inert arsenite of iron. The antidote is prepared by treating a boiling solution of crystallized sulphate of iron (green vitriol,) with nitric acid, so long as orange fumes are given off, diluting and filtering the liquor, and then precipitating it by an excess of ammonia. The alkali throws down the hydrated peroxide as a reddish precipitate which must be carefully washed. It is essential to its efficacy, that the oxide should be administered in its pulpy and recent state, and in a dose at least twelve times as great as the amount of the poison supposed to be taken; but as the antidote is perfectly innocent in itself, it is prudent to give it in much larger quantities. Its efficacy is of course greater, the sooner it is administered after the ingestion of the poison; but even after delay, its use will prove advantageous, so long as there is reason to believe that any of the poison still remains in the stomach. (*Journ. de Pharm.* t. xxi. p. 98.)

The antidote above mentioned having been faithfully applied, the medical treatment will consist in the administration of mucilaginous drinks. Should the patient survive long enough for inflammatory symptoms to arise, these should be combated on the general principles for treating inflammation. Accordingly, venesection and leeches may become necessary; and in the course of the treatment, emollient enemata, antispasmodics, and narcotics will often prove useful in allaying pain and nervous irritation. Convalescence is generally long and distressing, and hence it becomes of the greatest importance to attend to the diet, which should consist exclusively of milk, gruel, cream, rice, and similar bland articles.

Reagents for detecting Arsenious Acid. As arsenic is so frequently employed for criminal purposes, or self-destruction, it becomes of importance to detect its presence in medico-legal investigations. The tests for this poison may be divided into, 1. Those which indicate indirectly its presence; and, 2. Those which demonstrate its presence incontestibly, by bringing it to the metallic state. The former embrace all the liquid reagents, so called; the latter the different processes for metallization.

The most characteristic reagents, according to Dr. Christison, are *sulphuretted hydrogen*, *ammoniacal nitrate of silver*, and *ammoniacal nitrate of copper*. In the opinion of this writer, the concurrent indications of these three tests are all-sufficient for detecting in an infallible manner the presence of arsenious acid; but we think that in questions involving life and death, it is best to make assurance doubly sure, and, therefore, that the metallization of the poison ought never to be omitted.

In using sulphuretted hydrogen, the solution must be neutral. An excess of alkali may be neutralized with acetic acid; and an excess of nitric or sulphuric acid, by potassa. A slight excess of acetic acid is not, however, hurtful; on the contrary, it rather favours the subsidence of the precipitate, which is of course sulphuret of arsenic. According to Dr. Christison, this test is so exceedingly delicate, that it detects the poison, when dissolved in one hundred thousand parts of water. The colour it produces is lemon or sulphur-yellow; but the presence of vegetable or animal matter commonly changes it to a whitish or brownish tint. Some medical jurists recommend the use of sulphuretted hydrogen water; but the gas is far preferable. It can be applied with much convenience by using one of Dr. Hare's self-regulating gas reservoirs.

Dr. Christison has shown, that how delicate soever the ammoniacal nitrate of silver may be in ordinary solutions, it is not to be depended upon in dilute solutions of this poison, where animal or vegetable matter is present; for the precipitate is either not formed, in consequence of the organic principles exerting a solvent power over it, or, if formed, is essentially altered in colour.

The ammoniacal sulphate of copper is a test of very great delicacy. The precipitate occasioned by it is the arsenite of copper, of an apple-green or grass-green colour. Its operation is prevented by muriatic, nitric, sulphuric, acetic, citric, and tartaric acids in excess; as also by ammonia. But a greater objection to it is, that its indications fail when animal or vegetable matter is present, in case the arsenic is not abundant.

Of the three tests mentioned, perhaps the sulphuretted hydrogen is the most delicate; and it has the advantage of yielding a precipitate eligible for subsequent reduction. But they are all liable to the objection of being obscured in their indications, where the amount of poison is minute, by the presence of organic principles; a complication which constitutes the most difficult problem which can be presented to the attention of the medical jurist. As this case includes all others of more easy solution, we shall suppose it presented to the medical chemist, and shall indicate the steps which are to be pursued.

Having obtained general indications of the presence of arsenic, the first step will be to separate the organic matters; the second, to throw down the arsenic by means of sulphuretted hydrogen; and the third, to reduce the precipitate obtained.

The following are the directions laid down by Dr. Christison for separating the organic principles. Boil the suspected matter with distilled water for half an hour, and filter, first through gauze to separate the coarser particles, and afterwards through paper. To the transparent solution thus obtained, add acetic acid, which will coagulate some animal principles. To ascertain whether the solution has been sufficiently freed from animal matter by this measure, neutralize with ammonia, and test a small portion of it with the ammoniacal nitrate of silver. If this gives a characteristic precipitate, the solution is sufficiently deprived of animal matter; if not, another measure must be adopted to separate it. This consists in first rendering the solution neutral or slightly alkaline, next faintly acidulating with muriatic acid, and then adding an excess of nitrate of silver. This salt precipitates the animal matter in combination with oxide of silver. After this step, the excess of silver is thrown down by a slight excess of chloride of sodium, (common salt,) and the solution filtered.

Having in this manner disembarrassed the solution from organic matter, the free nitric acid is neutralized by potassa in slight excess, and the solution acidulated with acetic acid. A stream of sulphuretted hydrogen is then passed through it, which will throw down the arsenic as a sulphuret. If the proportion of arsenic be very small, a yellowness only will be produced, owing to the precipitate being soluble in an excess of the precipitant. In this case it is necessary to boil, to drive off the excess of sulphuretted hydrogen. The precipitate is then collected and dried. If it be very minute, it must be allowed to subside, and the supernatant liquid having been withdrawn, the remainder is to be poured upon a filter. After filtration, the precipitate is washed down to the bottom of the filter by means of the instrument called a *pipette*, employed for washing scanty precipitates. The filter is then gently pressed between folds of bibulous paper, and the precipitate removed with the point of a knife before it dries, and then dried in little masses on a watch-glass. In this manner Dr. Christison states that it is easy to collect so small a portion of the sulphuret as the twenty-fifth part of a grain. The precipitate is then to be reduced by means of a flux, which this author recommends to consist of two parts of ignited carbonate of soda and one of charcoal, as preferable to black flux. The best flux for the arsenious acid is freshly ignited charcoal.

A method different from that of Dr. Christison has been recommended by M. Taufflier for separating organic substances. It consists in adding to the mucilaginous liquid, resulting from the decoction of the suspected matters, a solution of oxide of zinc in potassa. The oxide precipitates in union with the organic substances, while the potassa unites with the arsenious acid and remains in solution. The clear solution, obtained by decantation or filtration, being then acidulated with muriatic acid, the arsenic is precipitated by sulphuretted hydrogen, as recommended by Dr. Christison. (*Journ. de Pharm.* xx. 392.)

The general formula for reduction is as follows. The operation is performed in a small glass tube. If the matter to be operated on is small, it is introduced to the bottom of the tube, and then a little of the flux is added to cover it, care being taken that the materials are conducted to the place they are to occupy, by means of a small glass funnel with a slender stem, without soiling the empty part of the tube. The heat is to be applied by means of a spirit lamp, the upper part of the material being first heated with a small flame, and afterwards the lower part with a larger flame. A little water, disengaged at first, should be removed with a roll of filtering paper, before sufficient heat has been applied to sublime the metal. When the dark crust begins to form, the tube should be held quite steady, and in the same part of the flame. This crust is the metallic arsenic, having the surface next the tube resplendent and polished, and the interior surface crystallized. Its characters are quite distinct, even when it does not amount to more than the three-hundredth part of a grain.

Off. Prep. Arsenicum Album Sublimatum, *Lond.*, *Dub.;* Liquor Potassæ Arsenitis, *U.S.*, *Ed.;* Ceratum Arsenici, *U.S.* B.

ACIDUM CITRICUM. *U.S.*, *Lond.*, *Dub.*

Citric Acid.

Off. Syn. ACIDUM CITRICUM CRYSTALLIZATUM. *Ed.*

Acidum limonis; Acide citrique, *Fr.;* Citronensäure, *Germ.;* Acido citrico, *Ital.*, *Span.*

Citric acid is the peculiar acid to which limes and lemons owe their acidity, being found in greatest abundance in the former. It is present also in the juice of other fruits, though in smaller amount; such as the European cranberry, (Vaccinium Oxycoccus,) the red whortelberry, (Vaccinium Vitis idæa,) the berry of the bittersweet, (Solanum Dulcamara,) the red gooseberry, (Ribes Grossularia,) the garden currant, (Ribes rubrum,) the strawberry, (Fragaria vesca,) the raspberry, (Rubus idæus,) and the tamarind, (Tamarindus Indica.)

The acid is extracted from lemon or lime juice by a very simple process, for which we are indebted to Scheele. The juice is imported into the United States from the West Indies, principally from the Island of Cuba, for the purpose of being converted into syrup, or manufactured into citric acid. To obtain the acid, the juice is first completely saturated by carbonate of lime, (chalk or whiting,) in fine powder, and the citrate of lime formed is allowed to subside. This is then washed repeatedly with water, and decomposed by diluted sulphuric acid. An insoluble sulphate of lime is immediately formed, and the citric acid, being separated, remains in the supernatant liquor. This is carefully concentrated in leaden boilers, until a pellicle begins to form, when it is transferred to other vessels in order to cool and crystallize. As the crystals obtained by the first crystallization are generally brown, they require to be redissolved and recrystallized for several successive times, in order to render them pure and white.

Mr. Parkes, in his Chemical Essays, has given a very interesting account of the manufacture of citric acid, which is made in large quantities in London for the use of the calico-printers. As Mr. P. was himself engaged in this manufacture, the following outline of the process which he pursued, may be received with greater confidence. The juice is placed in large square vats, in which it is saturated with clean soft chalk or whiting, gradually added to prevent excessive effervescence. The insoluble citrate of lime is allowed to subside, and the supernatant liquid, containing mucilage, saccharine matter, and a little malic acid, is drawn off by means of a syphon. The citrate is then passed through a sieve, and washed with warm water, until all remaining mucilage, and other soluble impurities are removed. It is then decomposed, while yet moist, by means of sulphuric acid, taken in the proportion of nine pounds and a half of the strong acid diluted with seven gallons of water, for every ten pounds of chalk used in the saturation. Some deduction, however, may be made from the water of dilution, in consideration of the water present in the moist citrate. The quantity of chalk expended may be easily ascertained by weighing out more than is sufficient for the purpose of saturation, and weighing the remainder after the point of saturation shall have been attained. The sulphuric acid is gradually poured in immediately after the water has been added to it, in order that the decomposition may be assisted by the heat generated by its dilution; and at the same time, the whole is well stirred with a strong wooden spatula, in order to prevent the citrate from running into lumps and thus escaping the action of the acid. As the point of complete decomposition of the citrate approaches, the sulphate of lime precipitates more and more quickly, and the quantity of supernatant liquid becomes sensibly greater. When the decomposition has been completed, the solution of citric acid is drawn off, and the sulphate of lime washed repeatedly with *cold* water, to separate any remains of acid. The solution of the acid, together with the washings, is then concentrated by evaporation in leaden boilers, until it reaches the sp. gr. of about 1.130; when the fire is to be withdrawn and the acid removed to a smaller leaden vessel, where it undergoes a further concentration by means of a water-bath. When the bulk of the acid liquor becomes very much reduced by evaporation, it requires to be transferred to a still smaller leaden boiler, where it is further evaporated by the same means, until the liquor acquires the consistence of very thin molasses. It is then watched with the greatest attention for noting the production of a pellicle, upon the appearance of which over the whole surface of the liquor, the acid is to be deemed sufficiently concentrated, and must be immediately removed from the water-bath, and laid aside to cool and crystallize. If at this stage of the process the removal of the acid were neglected, the whole would be in danger of being carbonized and spoiled.

The liquor is allowed to remain at rest four days, that crystals may be formed, from which the mother waters, presenting a black colour, are to be drained. These are then diluted with ten or twelve times their bulk of water, saturated anew by means of carbonate of lime, and treated in all respects as if they consisted of fresh lemon juice. By this proceeding, a new crop of crystals will be obtained.

Whatever care may be taken in conducting the process, the first crop of crystals will be of a light brownish colour; but if the solution has been burnt during the evaporation, or the mucilage imperfectly separated, they will be dark brown or black. In order to have the crystals perfectly pure and white, it is necessary to subject them to repeated solutions and crystallizations. According to Mr. Parkes, a gallon of good juice, if the process be well conducted, will yield eight ounces of white crystals. But the product depends very much on the quality of the juice, which is very variable as to the quantity of citric acid which it contains. The more recent the juice the better the quality. That which is stale will sometimes be quite sour, without containing any citric acid, in consequence of having undergone the acetous fermentation.

In decomposing the citrate of lime by sulphuric acid, it is not prudent to trust altogether to the appearance of the liquor, in deciding when the decomposition is complete. A more certain criterion is to filter a small portion of the liquor, and test it with acetate of lead. If no sulphuric acid be present in excess, the precipitate will consist of citrate of lead, and be entirely soluble in nitric acid. On the contrary supposition, the precipitate will be a mixture of citrate and sulphate of lead, the latter of which will remain undissolved on the addition of nitric acid.

It is desirable to have a slight excess of sulphuric acid; as it rather favours than otherwise the crystallization of the citric acid. It is found necessary also, to add occasionally a small portion of sulphuric acid to the citric acid liquor, during the progress of its concentration.

Citric acid is manufactured in different cities of the United States, for use in the arts and in medicine. In Philadelphia it is made in the usual manner, from the juice of limes and lemons, to the extent, perhaps, of 500 pounds annually, and commands the wholesale price of $2 75, or $3 00 per pound. The juice which is imported is of variable quality, furnishing from four to six ounces of the pure crystallized acid to the gallon.

Citric acid is very properly placed in the materia medica of the United States and Edinburgh Pharmacopœias, as an article purchased from the manufacturing chemist, and not made by the apothecary. The Dublin College introduces it among its preparations; while the London places it in the materia medica, and also gives a process for preparing it.

The following is an outline of the processes of the London and Dublin Pharmacopœias for preparing this acid. The London College adds an ounce of prepared chalk, or a sufficient quantity for saturation, to a pint of lemon juice. The resulting citrate of lime is then dried, and decomposed by means of nine fluidounces of diluted sulphuric acid. The process of the Dublin College is the same, with the exception that the dried citrate is decomposed by a quantity of diluted sulphuric acid, equal to eight times the weight of the chalk employed.

It would seem, that both these Colleges use an excess of sulphuric acid. The acid should always bear a fixed relation to the chalk employed; and this relation was ascertained by Mr. Phillips to be nearly six fluidounces of the officinal diluted sulphuric acid to the ounce of chalk. This chemist considers the drying of the citrate to be an injudicious direction, as the salt will be more readily decomposed in the moist state.

Properties. Citric acid is a white crystallized solid, often in large crystals, permanent in the air, and having the form of rhomboidal prisms with dihedral summits. Its sp. gr. is 1.6. Its taste is strongly acid, and almost caustic. When heated, it dissolves in its water of crystallization, and at a higher temperature undergoes decomposition, becoming yellow or brown, and forming a very sour syrupy liquid, which is uncrystallizable. By destructive distillation, it gives rise to water, empyreumatic oil, acetic and carbonic acids, carburetted hydrogen, and a peculiar acid, called pyrocitric.

Citric acid dissolves in three-fourths of its weight of cold, and half its weight of boiling water. A weak solution of it has an agreeable taste, but cannot be kept, as it undergoes spontaneous decomposition. It is incompatible with alkaline solutions, whether pure or carbonated; converting them into citrates; also with the earthy and probably all the metallic carbonates, most acetates, the alkaline sulphurets, and soaps. It is characterized by its taste, by the shape of its crystals, and by its forming an insoluble salt with lime, and a deliquescent one with potassa. Sometimes the larger crystals of tartaric acid are sold for the citric, a fraud which is readily detected by the addition of carbonate of potassa, which forms with the substituted acid a crystalline precipitate of bitartrate of potassa, (cream of tartar.) Druggists throughout the United States may obtain citric acid in Philadelphia, in full confidence of its purity, from the warehouse of Mr. John Elliott, manufacturing chemist, who prepares it on a large scale, and of the best quality.

Composition. This acid consists of two equivalents of hydrogen 2, four equivalents of carbon 24.48, and four equivalents of oxygen 32=58.48. The crystallized acid contains two equivalents of water 18, making its equivalent 76.48.

Medical Properties. Citric acid is principally employed for making a substitute for lemonade, and in the composition of the neutral mixture and effervescing draughts. When added in the quantity of nine drachms and a half to a pint of distilled water, it forms a solution of the average strength of lime juice. Of this solution, or of lemon juice, a scruple of bicarbonate of potassa saturates three fluidrachms and a half; a scruple of carbonate of potassa, four fluidrachms; and a scruple of carbonate of ammonia, six fluidrachms. Half a fluidounce of lemon juice, or of an equivalent solution of citric acid, when saturated, is considered as a dose. An agreeable substitute for lemonade may be formed by dissolving from two to four parts of the acid, mixed with a little sugar and oil of lemons, in nine hundred parts of water; or a scruple of the acid may be dissolved in a pint of water, and sweetened to the taste with sugar which has been rubbed on fresh lemon-peel. B.

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ACIDUM MURIATICUM. *U.S., Lond., Ed., Dub.*

Muriatic Acid.

Spirit of sea-salt, Marine acid, Hydrochloric acid; Acide hydro-chlorique liquide, *Fr.;* Salzsäure, Kochsalzsäure, *Germ.;* Acido muriatico, *Ital., Span.*

The muriatic acid of pharmacy and the arts, is a solution of muriatic acid *gas* in water, and is sometimes called *liquid* muriatic acid. Its officinal sp. gr., according to the United States, London, and Dublin Pharmacopœias, is 1.16; according to the Edinburgh, 1.17. The three British Colleges give a process for its preparation; while in the United States Pharmacopœia, it is placed exclusively in the list of materia medica, as an article to be procured from the manufacturing chemist.

Preparation. Muriatic acid is obtained by the action of sulphuric acid on chloride of sodium or common salt. It is procured, on a large scale, by distilling the salt with an equal weight of sulphuric acid, somewhat diluted with water, from iron stills furnished with earthen heads, into earthenware receivers containing water. Thus obtained, it is contaminated with iron and other impurities, and is not fit for medicinal purposes.

The acid is generally prepared in the laboratory, by saturating distilled water with the gas in a Woulfe's apparatus. A quantity of pure fused* common salt is introduced into a retort or matrass, placed in a sand-bath. The vessel is then furnished with an S tube, and connected with the series of bottles, each two-thirds full of water. A quantity of sulphuric acid is then gradually added, equal in weight to the common salt employed, and diluted with one-third of its weight of water. The materials ought not to occupy more than half the body of the retort. When the extrication of the gas slackens, heat is to be applied, and gradually increased until the water in the bottles refuses to absorb any more, or until upon raising the heat, no more gas is found to come over. As soon as the process is completed, boiling water is to be added to the contents of the retort, in order to facilitate the removal of the residue. During the progress of the saturation, the water in the several bottles suffers an increase of temperature, which lessens its power of absorption. It is therefore expedient, in order to obtain a strong acid, to keep the bottles cool by means of water or ice. The connecting tubes need not plunge deeply into the acid.

The rationale of the process for obtaining this acid is sufficiently simple. Common salt is a compound of chlorine and sodium; muriatic acid, of chlorine and hydrogen; and liquid sulphuric acid, of dry sulphuric acid and water. The water is decomposed; its oxygen, combining with the sodium of the common salt, generates soda, which unites with the sulphuric acid to form sulphate of soda; while the hydrogen and chlorine, being in the nascent state, combine, and escape as muriatic acid gas. The residue of the process is consequently sulphate of soda or Glauber's salt. It is reserved by the British Colleges to be dissolved and crystallized, in order to form the officinal sulphate of soda. (See *Sodæ Sulphas.*)

The following is a synopsis of the proportions of the ingredients prescribed by the British Colleges for obtaining this acid:—*London*, two pounds of dried chloride of sodium, twenty ounces of sulphuric acid, and a pint and a half of distilled water:—*Edinburgh*, equal weights of salt, acid, and water; the salt having been previously exposed to a red heat:—*Dublin*, one hundred parts of dried salt, eighty-seven of commercial sulphuric acid, and one hundred and twenty-four of water.

The three Colleges distil the materials to dryness, the London and Edinburgh directing the use of a sand-bath. One-third of the water prescribed in the London and Edinburgh Pharmacopœias, and one-half of that directed in the Dublin, is mixed with the sulphuric acid; the rest being put into the receiver to absorb the gas. The diluted acid is allowed to cool before being added to the salt. The London College add the salt to the diluted acid, previously introduced into the retort, while the other two Colleges pursue the more convenient plan of adding the acid to the salt.

From the above view, it is perceived that the British Colleges differ as to the proportion of acid to the salt. Theory calls for a little less than 82 parts of the liquid acid to 100 of the common salt; while the London College uses about 83 parts, the Dublin 87, and the Edinburgh 100 parts of acid to that quantity of salt. The London proportions are, therefore, nearest the theoretical quantities, and would even seem to furnish a slight excess of acid; but from careful experiments made by Dr. Barker of Dublin, it appears to be demonstrated, that to decompose completely the whole of the salt, 87 parts of strong acid are necessary; for it is a principle now generally conceded, as was contended for many years ago by Dr. Hope, that to produce complete decomposition of a salt, it is sometimes necessary to use more than an equivalent quantity of the decomposing agent. Accordingly, Dr. Hope declares in favour of the Edinburgh process, that equal weights of acid and salt give a larger product of muriatic acid, with less expense of time and fuel, than when a smaller quantity of acid is employed.

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* According to Thenard, the fusion of the common salt will very much facilitate the conducting of the process.

The drying and igniting of the common salt is not done with a view, as was formerly supposed, of driving off water of crystallization, as it does not contain any; but it has been asserted by Dr. Duncan, that the ignition has the effect of affording a less coloured product, while it secures the incidental advantage of freeing the salt from the nitrate of potassa.

Properties of the Liquid Acid. Muriatic acid, when pure, is a transparent, colourless liquid, of a corrosive taste and suffocating odour. Exposed to the air, it emits white fumes, owing to the escape of the acid gas, and its union with the moisture of the atmosphere. As ordinarily seen, it has a straw colour, due to the presence either of iron or of a minute portion of organic matter, such as cork, wood, &c. When concentrated, it blackens organic substances like sulphuric acid. Its sp. gr. varies with its strength. When as highly concentrated as possible, its density is 1.21; when of proper medicinal strength, 1.16. Mixed with nitric acid, it forms nitro-muriatic acid, or aqua regia. (See *Acidum Nitromuriaticum.* Dub.)

As it is desirable to know, on many occasions, in chemical and pharmaceutical operations, the quantity of strong liquid acid, of acid gas, and of chlorine, contained in samples of acid of different densities, we subjoin a table by Dr. Ure, containing this information, as abridged by Dr. Duncan.

Table of the Quantity of Liquid Muriatic Acid of sp. gr. 1.2, *of Muriatic Acid Gas, and of Chlorine, in* 100 *parts of Liquid Acid of different densities.*

Sp. Gr.	Liquid Acid of sp. gr. 1.2	Acid Gas.	Chlorine.	Sp. Gr.	Liquid Acid of sp. gr. 1.2.	Acid Gas.	Chlorine.
1.2000	100	40.777	39.675	1.1102	55	21.822	22.426
1.1910	95	38.738	37.692	1.1000	50	20.388	19.837
1.1822	90	36.700	35.707	1.0899	45	18.348	17.854
1.1721	85	34.660	33.724	1.0798	40	16.310	15.870
1.1701	84	34.252	33.328	1.0697	35	14.271	13.887
1.1620	80	32.621	31.746	1.0597	30	12.233	11.903
1.1599	79	32.213	31.343	1.0497	25	10.194	9.919
1.1515	75	30.582	29.757	1.0397	20	8.155	7.935
1.1410	70	28.544	27.772	1.0298	15	6.116	5.951
1.1308	65	26.504	25.789	1.0200	10	4,078	3.968
1.1206	60	24.466	23.805	1.0100	5	2.039	1.984

Muriatic acid is characterized by forming, on the addition of nitrate of silver, a white precipitate, (chloride of silver,) which is insoluble in acids, but readily soluble in ammonia. It is incompatible with alkalies and most earths, with oxides and their carbonates, and with sulphuret and tartrate of potassa, tartar emetic, tartarized iron, nitrate of silver, and solution of subacetate of lead.

Adulterations. This acid, when pure, will evaporate without residue in a platinum spoon. If sulphuric acid be present, muriate of baryta will cause a precipitate, in the dilute acid, of sulphate of baryta. If nitric acid be present, the muriatic acid will have the properties of *aqua regia*, and will consequently dissolve gold-leaf. Iron may be detected by saturating the dilute acid with carbonate of soda, and then adding ferrocyanate of potassa, which will strike a blue colour in case that metal is present.

Properties of Muriatic Acid Gas. Muriatic acid gas is a colourless elastic fluid, possessing a pungent odour, and irritating properties to the organs of respiration. It destroys life and extinguishes flame. It reddens litmus strongly, and has the other properties of a strong acid. Its sp. gr. is 1.269. Subjected to a pressure of 40 atmospheres, at the temperature of 50°, it is condensed into a transparent liquid. It absorbs water with the greatest avidity, and according to the temperature and pressure, unites with a greater or less quantity of that liquid. Water, at the temperature of 69°, takes up 464 times its volume of the gas, increasing one-third in bulk, and about three-fourths in weight. Water thus saturated constitutes the strong liquid acid already described. With metallic oxides it forms either a muriate of the oxide, or a chloride of the metal and water.

Composition. Muriatic acid gas consists of one equiv. of chlorine 35.42, and one equiv. of hydrogen $1=36.42$; or of one volume of chlorine and one of hydrogen united without condensation. It is called *hydrochloric* and *chlorohydric* acid by the French chemical writers.

Medical Properties. Muriatic acid is refrigerant and antiseptic. It is exhibited, largely diluted with water, in fevers, some forms of syphilis, and in the phosphatic calculous diathesis. Dr. Paris has given it with success in the most malignant cases of typhus and scarlatina, administered in a strong infusion of quassia. The same writer has found it one of the most efficacious remedies for preventing the generation of worms, after a free evacuation of the bowels. It proves also a good adjunct to gargles in ulcerated sore throat and scarlatina maligna. The dose for internal exhibition is from ten to twenty minims in a sufficient quantity of some bland fluid, as barley water or gruel. In the composition of gargles it may enter in the proportion of from half a fluidrachm to two fluidrachms to six fluidounces of the vehicle.

Toxicological Properties. Muriatic acid, when swallowed in a poisonous dose, produces blackness of the lips, fiery redness of the tongue, hickups, violent efforts to vomit, and agonizing pain in the stomach. There is much thirst, great restlessness, a dry and burning skin, and a small concentrated pulse. If the acid has been recently swallowed, white vapours of a pungent smell are emitted from the mouth. The best antidote is magnesia, which acts by saturating the acid. Soap is also useful for the same reason. In the course of the treatment, bland and mucilaginous drinks must be freely given. When inflammation supervenes, it must be treated on the general principles for combating inflammation from other causes.

Off. Prep. Acidum Muriaticum Dilutum, *Dub.;* Acidum Nitromuriaticum, *Dub.;* Antimonii Oxydum Nitromuriaticum, *Dub.;* Barytæ Murias, *U.S., Ed., Dub.;* Ferrum Ammoniatum, *Lond.;* Liquor Calcis Muriatis, *U.S., Ed.;* Tinctura Ferri Muriatis, *U.S., Lond., Ed., Dub.* B.

ACIDUM NITRICUM. *U.S., Lond., Ed., Dub.*

Nitric Acid.

Spirit of nitre; Aqua fortis; Acide nitrique; Acide azotique, *Fr.;* Salpetersäure, *Germ.;* Zalpeterzuur Skerkwater, *Dutch;* Skedwatter, *Swed.;* Acido nitrico, *Ital., Span.*

This is a very powerful acid, obtained from nitrate of potassa or nitre, by the action of sulphuric acid. It is officinal in all the Pharmacopœias. The British Colleges give a process for obtaining it; but, in the United States Pharmacopœia, it is more properly placed in the materia medica list, as an article to be purchased from the manufacturing chemist. Its officinal sp. gr. in the United States and Lond. Pharm., is 1.5; in the Dublin, 1.49. The Edin. College does not indicate its sp. gr.

The usual process adopted in the laboratory for obtaining this acid is to add to nitrate of potassa in coarse powder, contained in a retort, an equal weight of strong sulphuric acid, poured in by means of a tube or funnel, so as not to soil the neck. The materials should not occupy more than two-thirds of the capacity of the retort. A receiver being adapted, heat is applied by means of a spirit-lamp, the naked fire, or a sand-bath, moderately at first, but afterwards more strongly when the materials are observed to be beginning to get solid, in order to bring the whole into a state of perfect fusion. Red vapours will at first arise, and afterwards disappear in the progress of the distillation. Towards its close they will be reproduced, which is an indication that the process is completed.

The rationale of this process is as follows. Nitrate of potassa is a dry salt, consisting of one equiv. of nitric acid and one of potassa. Liquid sulphuric acid consists of one equiv. of dry sulphuric acid and one equiv. of water; and liquid nitric acid, of one equiv. of dry nitric acid and one and a half equiv. of water. The equivalent quantities of the materials are one equiv. of nitrate of potassa and two equiv. of liquid sulphuric acid. Two equiv. of dry sulphuric acid, combine with the one equiv. of potassa, forming one equiv. of bisulphate of potassa, which remains in the retort retaining half an equiv. of water; while the remaining one and a half equiv. of water from the sulphuric acid, uniting with one equiv. of dry nitric acid, form one equiv. of liquid nitric acid, which distils over. Thus it is perceived that liquid sulphuric and nitric acids differ in this respect, that the former contains one, the latter one and a half equivalents of water, to one of the dry acid. Now nitric acid is incapable, according to Mr. Phillips, (*Phil. Mag.* ii. 430,) of existing in the ordinary liquid state, without being combined with at least one and a half equivalents of water; and as the residual bisulphate requires half an equivalent more, it becomes necessary, in effecting the decomposition of the nitre, to employ a quantity of liquid sulphuric acid which contains two equivalents of water.

The quantities of salt and acid for mutual decomposition, are in round numbers 102 of the former and 98 of the latter. Now this approaches very nearly to equal weights, the quantities found most eligible in practice; and when it is recollected that the theoretical proportions are based upon the supposition of a perfectly concentrated sulphuric acid, which is not always the condition of the acid of commerce, the slight excess of acid, which equal weights would seem to give, may be necessary to make up for any deficiency in its strength.

The British Colleges differ somewhat in the proportion of the materials which they employ for making this acid. The following is an outline of their respective processes.

The *London* College takes equal weights, (two pounds, each,) of dried nitrate of potassa and sulphuric acid. These are mixed in a glass retort, and the nitric acid is distilled by means of a sand-bath, until red vapours arise. The acid is then redistilled from an ounce of nitrate of potassa. Two hundred and twelve grains of crystallized carbonate of soda are saturated by one hundred grains of this acid.

The *Dublin* College mixes one hundred parts of nitrate of potassa with ninety-seven parts of commercial sulphuric acid, "in a glass retort, and with an apparatus adapted to collecting the acid products, distils until the residuum in the retort concretes, and again becomes liquid."

The *Edinburgh* College first obtains a red fuming acid under the name of nitrous acid, by one formula; and by a separate one, exposes this to a gentle heat to dissipate the red portion, and convert it into nitric acid. The following is an outline of these two processes.

Acidum Nitrosum. *Ed.*—Pour sixteen ounces of sulphuric acid on two pounds of bruised nitrate of potassa, and distil by means of a sand-bath by a heat gradually increased, until the iron pot begins to be red-hot. The sp. gr. of this acid is 1.52.

Acidum Nitricum. *Ed.*—Take any quantity of nitrous acid, and pour it into a glass retort. Then having adapted a cooled receiver, expose the acid to a very gentle heat, until the red portion has passed over, and the nitrous acid, nearly deprived of colour, has been converted into nitric acid.

The proportions of the London College are perhaps the best for obtaining nitric acid, for reasons already explained. They are preferred also by Thenard, and, being equal weights, have the advantage of being easily remembered. The redistillation from nitre, ordered by this College, is intended to free the product from any contaminating sulphuric acid. It is, however, unnecessary; for if the sulphuric acid be added in the process, without soiling the neck of the retort, the nitric acid obtained will never be impure from this cause.

The Dublin proportions of acid and nitre were deduced by Dr. Barker from careful experiments, and approach more nearly to the exact quantities for mutual decomposition than equal weights. They may be considered as virtually the same with the London.

The Edinburgh College uses a proportion of sulphuric acid considerably less than the other Colleges, being only two-thirds of the weight of the nitre. The consequence is, that sufficient water is not present to condense the elements of the nitric acid; and accordingly a part of the acid is resolved into nitric oxide or red nitrous acid fumes, which, uniting with the undecomposed acid, give rise to a red acid product, erroneously called by the College *nitrous* acid. Hence arises the necessity of the subsequent application of heat to dissipate the red portion, in the process for bringing it to the state of nitric acid.

According to the Edinburgh proportions, it is perceived that there is more than one, but less than two equivalents of sulphuric acid to one of the salt. It has been very justly remarked by Mr. Phillips, that one equivalent of sulphuric acid is competent to decompose one equivalent of nitrate of potassa, but not sufficient, from the deficiency of water, to condense and preserve all the nitric acid extricated. Dr. Hope, however, Professor of Chemistry in the University of Edinburgh, defends the process of the College, and insists that the proportion of sulphuric acid used is sufficient to decompose the nitre, with the result of giving an acid of great strength and free from sulphuric acid. The late Dr. Duncan also advocated the Edinburgh proportions, by alleging that they are the same as those of the Paris Codex.

The question of the relative eligibility of the London and Edinburgh processes is not to be decided solely by the strength of the product, but by its strength and amount considered conjointly, and by those incidental advantages or disadvantages which may attach to either process. Neither ought the nitrous acid product to be made the basis of comparison; but rather the nitric acid, which may be obtained from it by the subsequent exposure to heat. Comparing the two processes in this point of view, it cannot fail to strike every one that the copious production of red vapours, as happens in the Edinburgh process, must lessen the amount of the nitric acid; and though it may be alleged, that they are in the nitrous acid, they are lost when this is converted into nitric acid. Mr. Phillips found that 150 parts of red nitrous acid, of the sp. gr. 1.52, yielded, by the application of heat, only 114 of pale nitric acid, of sp. gr. 1.49; while 27 parts of red nitrous acid of sp. gr. 1.58 distilled over. The loss, therefore, amounted to 9 parts. It is also an incidental disadvantage of the Edinburgh process, that the residual salt is a mixture of sulphate and bisulphate of potassa, which is not so readily washed out as the bisulphate, and the removal of which is much more apt to cause the fracture of the retort. Any saving which arises from the use of less sulphuric acid in the Edinburgh process, is perhaps more than counterbalanced by this circumstance.

As the main objection to the process of the Edinburgh College is that the quantity of water supplied to the elements of the nitric acid is too small, while the sulphuric acid used is amply sufficient to decompose the salt; the question arises, how far it would answer a good purpose to add the necessary quantity of water to the sulphuric acid, before its addition to the nitre. This plan has been adopted by Döbereiner, who has found that a larger though less concentrated product is obtained when one part of water is added to nine parts of sulphuric acid, just before its addition to the nitre.

As in medicine and most of the arts, a strong nitric acid is not required, we would suggest, that one equivalent of nitre might be decomposed with least loss of acid, by being distilled with one equivalent of liquid sulphuric acid, previously united with three and a half equivalents of water. The water in this case would form a nitric acid with four equivalents of water, constituting a liquid acid, in which the acid and water are united with the strongest affinity, and which boils without undergoing any change. On these principles, Berzelius states, that where it is not necessary to have a concentrated nitric acid, it is best to dilute the sulphuric acid with an equal weight of water, before commencing the distillation. Whenever this plan is adopted, iron distillatory vessels cannot be used, as the dilute sulphuric acid would act on them much more rapidly than when it is in a concentrated state.

We have stated above, that the red acid of the Edinburgh College is erroneously called nitrous acid. It is in fact nitric acid holding nitric oxide in solution. Indeed, the acid of the other Colleges, is to a certain extent of the same nature, as it is generally yellow from the presence of a small quantity of the same gas. Real nitric acid is perfectly colourless. Nevertheless, it may be proper to add, that, according to the equivalent numbers, if we suppose two equivalents of nitric acid, united to one equivalent of nitric oxide, the compound would correspond to three equivalents of nitrous acid. The red acid, whatever may be its exact nature, is known to be considerably denser than the real pale nitric acid. The officinal red acid, as already stated, has the density of 1.52. When at its highest degree of concentration, it weighs, according to Meissner, 1.63; while the strongest perfectly colourless nitric acid, according to the same authority, has the sp. gr. of 1.48 only.

Upon the whole, we prefer the process of the Dublin College for obtaining nitric acid. The proportions adopted are good, and the unnecessary redistillation of the London College is omitted.

Preparation of Nitric Acid for the Arts. Two strengths of this acid occur in the arts;—*double aqua fortis*, which is half the strengh of concentrated nitric acid, and *single aqua fortis*, which is half as strong as the double. Aqua fortis is frequently obtained by distilling a mixture of nitre and calcined sulphate of iron. By an interchange of ingredients, sulphate of potassa and nitrate of iron are formed, the latter of which, at the distilling heat, readily yields its nitric acid. The sulphate of potassa is washed out of the residue, and the peroxide of iron which is left, is sold, under the name of colcothar, to the polishers of metals. The distillation is performed in large cast-iron retorts, lined on the inside with a thick layer of red oxide of iron, to protect them from the action of the acid. The acid is received in large glass vessels containing water. A considerable portion of the acid is decomposed by the heat into reddish vapours, which subsequently dissolve in water, and absorb the oxygen which has been disengaged. The acid thus obtained is red and tolerably strong; but it is diluted with water before being thrown into commerce. The sp. gr. of this acid is about 1.22.

In France, nitric acid is manufactured on the large scale from nitre and sulphuric acid, in cast-iron cylinders. The cylinders are disposed horizontally across a furnace, and are strewed internally throughout their whole length with nitre. Two circular cast-iron plates, each pierced with a hole, serve to close the extremities. At one, the sulphuric acid is poured in, and by means of a stoneware tube connected with the other, the nitric acid is collected in receivers. The sulphate of potassa is removed after each operation. The iron cylinders are acted upon by the acid; yet, notwithstanding this disadvantage, the process, when conducted in such vessels, is attended with a great saving of expense.

In England, nitric acid is generally procured for the purposes of the arts, by distilling the materials in earthenware retorts, or cast-iron pots with an earthen head, connected with a series of glass or stoneware receivers containing water. The proportion of sulphuric acid employed by the manufacturer, is between one and two equivalents; and hence the product has an orange-red colour, which is removed by heating the acid.

In the United States, nitric acid is made on the large scale, in a distillatory apparatus, having the same general arrangement as in France and England. Sometimes a cast-iron cylinder is used as in France, and sometimes a thick cast-iron pot, with an earthenware head. The pot is set in brickwork over a fire-place, and the materials having been placed in it, the head is luted on with a fat lute, and made to communicate with two receivers, either of stoneware or glass, connected together by means of a tube. Large demijohns of glass answer the purpose of receivers very well. The incondensible products are made to pass by means of a tube into a portion of water. The quantity of sulphuric acid employed in different establishments, varies from one-half to two-thirds of the weight of the nitre. In a very large chemical establishment in this city, which we have had the pleasure of inspecting, through the kindness of the liberal proprietor, the proportions employed for a charge are 150 pounds of nitre to 84 pounds of strong sulphuric acid. Nitrate of soda, having been latterly imported into the United

States in large quantities from Peru, has been used by some manufacturing chemists to obtain nitric acid. It yields a larger amount of acid for a given weight than the nitrate of potassa; but the residuum, sulphate of soda, is less valuable than sulphate of potassa. The latter salt may be sold to the alum makers at the average price of twenty dollars per ton.

Nitric acid is never imported into the United States; the foreign article not being able to enter into competition with the home manufacture.

Properties. Nitric acid, so called from nitre, is a dense liquid, extremely sour and corrosive. It was discovered by Raymond Lully, in the 13th century, and its constituents, by Cavendish, in 1784. When perfectly pure, it is colourless; but as usually obtained, it has a straw-colour, owing to the presence of nitrous acid. Exposed to the air, it emits white fumes, possessing a disagreeable odour. By the action of light, it undergoes a slight decomposition and becomes yellow. Its sp. gr., when as highly concentrated as possible, is 1.513. It acts powerfully on animal matter, producing its decomposition. On the living fibre it operates as a strong caustic. It stains the skin and most animal substances of an indelible yellow colour. On vegetable matter, it acts, when concentrated, by imparting oxygen, converting the carbon into carbonic acid, and the hydrogen into water. When diluted, it converts most animal and vegetable substances into oxalic, malic, and carbonic acids. The general character of its action is to impart oxygen to other bodies, which it is enabled to do in consequence of the large quantity of this principle which it contains in a state of loose combination. It acidifies sulphur and phosphorus, and oxidizes all the metals, except chromium, tungsten, columbium, cerium, titanium, osmium, rhodium, gold, platinum, and iridium. In the liquid state, it always contains water, which is essential to its existence in that state. Mixed with a certain quantity of water, it forms the diluted nitric acid of the London and Dublin Pharmacopœias. (See *Acidum Nitricum Dilutum.*) It combines with salifiable bases and forms nitrates. With muriatic acid, it constitutes nitro-muriatic acid or aqua regia. (See *Acidum Nitromuriaticum*, Dub.) When of the sp. gr. 1.42, its composition being one equivalent of dry acid and four equivalents of water, it boils at 250°. When either stronger or weaker, it volatilizes at a lower temperature; and by losing more acid than water in the first case, and more water than acid in the second, it constantly approaches to the sp. gr. of 1.42, when its boiling point becomes stationary.

As in many chemical and pharmaceutical operations, a nitric acid below the standard strength is necessarily employed, it often becomes important to know the proportion of dry acid, and of acid of the standard strength of 1.5, contained in an acid of any given specific gravity. The following table, drawn up from experiments by Dr. Ure, gives information on these points.

Table, showing the Quantity of Liquid Nitric Acid, (sp. gr. 1.5.) *and of Dry Nitric Acid, contained in* 100 *parts of the Acid at different Densities.*

Sp.Gr.	*Liq. Acid in* 100	*Dry Acid in* 100	*Sp. Gr.*	*Liq. Acid in* 100	*Dry Acid in* 100	*Sp. Gr.*	*Liq. Acid in* 100	*Dry Acid in* 100	*Sp. Gr.*	*Liq. Acid in* 100	*Dry Acid in* 100
1.5000	100	79.700	1.4189	75	59.775	1.2947	50	39.850	1.1403	25	19.925
1.4980	99	78.903	1.4147	74	58.978	1.2887	49	39.053	1.1345	24	19.128
1.4960	98	78.106	1.4107	73	58.181	1.2826	48	38.256	1.1286	23	18.331
1.4940	97	77.309	1.4065	72	57.384	1.2765	47	37.459	1.1227	22	17.534
1.4910	96	76.512	1.4023	71	56.587	1.2705	46	36.662	1.1168	21	16.737
1.4880	95	75.715	1.3978	70	55.790	1.2644	45	35.865	1.1109	20	15.940
1.4850	94	74.918	1.3945	69	54.993	1.2583	44	35.068	1.1051	19	15.143
1.4820	93	74.121	1.3882	68	54.196	1.2523	43	34.271	1.0993	18	14.346
1.4790	92	73.324	1.3833	67	53.399	1.2462	42	33.474	1.0935	17	13.549
1.4760	91	72.527	1.3783	66	52.602	1.2402	41	32.677	1.0878	16	12.752
1.4730	90	71.730	1.3732	65	51.805	1.2341	40	31.880	1.0821	15	11.955
1.4700	89	70.933	1.3681	64	51.068	1.2277	39	31.083	1.0764	14	11.158
1.4670	88	70.136	1.3630	63	50.211	1.2212	38	30.286	1.0708	13	10.361
1.4640	87	69.339	1.3579	62	49.414	1.2148	37	29.489	1.0651	12	9.564
1.4600	86	68.542	1.3529	61	48.617	1.2084	36	28.692	1.0595	11	8.767
1-4570	85	67.745	1.3477	60	47.820	1.2019	35	27.895	1.0540	10	7.970
1.4530	84	66.948	1.3427	59	47.023	1.1958	34	27.098	1.0485	9	7.173
1.4500	83	66.155	1.3376	58	46.226	1.1895	33	26.301	1.0430	8	6.376
1.4460	82	65.354	1.3323	57	45.429	1.1833	32	25.504	1.0375	7	5.579
1.4424	81	64.557	1.3270	56	44.632	1.1770	31	24.707	1.0320	6	4.782
1.4385	80	63.760	1.3216	55	43.835	1.1709	30	23.910	1.0267	5	3.985
1.4346	79	62.963	1.3163	54	43.038	1.1648	29	23.113	1.0212	4	3.188
1.4306	78	62.166	1.3110	53	42.241	1.1587	28	22.316	1.0159	3	2.391
1.4269	77	61.369	1.3056	52	41.444	1.1526	27	21.519	1.0106	2	1.594
1.4228	76	60.572	1.3001	51	40.647	1.1465	26	20.722	1.0053	1	0.797

The *nitrous acid* of the Edinburgh College (*Acidum Nitrosum*) is a red or orange-coloured liquid, exceedingly volatile, and emitting red fumes of a suffocating odour. It consists of nitric acid holding nitric oxide in solution. When diluted with water, it parts with the nitric oxide and becomes successively blue, green, and yellow. Mixed with an equal weight of water, it forms the dilute nitrous acid of the Edinburgh College. (See *Acidum Nitrosum Dilutum.*)

Nitric acid, when uncombined, is recognized by its peculiar action on silver and copper, and by its forming nitre when saturated with potassa. When in the form of a nitrate, it is detected by its action on gold-leaf, after the addition of muriatic acid, in consequence of the evolution of the chlorine; or it may be discovered, according to Dr. O'Shaughnessy, by heating the supposed nitrate in a test tube with a drop of sulphuric acid, and then adding a crystal of morphia. If nitric acid be present, it will be set free by the sulphuric acid, and communicate an orange-red followed by a yellow colour to the morphia. To prevent all ambiguity, arising from the accidental presence of nitric acid in the sulphuric acid employed, the operator should satisfy himself by a separate experiment, that the latter acid has no power to produce the colours mentioned with morphia. (*Turner's Chemistry, Fifth Lond. Edit.*)

The most common impurities in nitric acid are sulphuric and muriatic acids; the former derived from the acid used in the process, the latter from common salt, which is not an unfrequent impurity in nitre. They may be detected by adding a few drops of the solution of muriate of baryta and nitrate of silver to separate portions of the nitric acid, diluted with three or four parts of distilled water. If these precipitants should produce a cloud, the muriate will indicate sulphuric acid, and the nitrate, muriatic acid. These impurities may be separated by adding nitrate of silver in slight excess, which will precipitate them as chloride and sulphate of silver, and then distilling nearly to dryness in very clean vessels. The sulphuric acid may also be got rid of by distilling from a fresh portion of nitre, as practised by the London College. These impurities, however, do not in the least affect the medicinal properties of the acid.

Composition. The officinal nitric acid consists of one equiv. of dry acid 54.15, and one and a half equiv. of water 13.5=67.65. The dry acid consists of one equiv. of nitrogen 14.15, and five equiv. of oxygen 40=54.15; or in volumes of one volume of nitrogen, and two and a half volumes of oxygen, supposed to be condensed, to form nitric acid vapour, into one volume. The strongest possible liquid acid consists of one equiv. of dry acid and one equiv. of water, and has the sp. gr. 1.513. (*Thenard.*)

Incompatibles. Most of the substances with which nitric acid is incompatible, may be inferred from what has been already said. It is incompatible with protosulphate of iron, which it converts into persulphate, with salifiable bases, carbonates, and sulphurets, and with the acetates of lead and potassa. It is also capable of decomposing alcohol, with which it forms nitric ether.

Medical Properties. Nitric acid is tonic and antiseptic. Largely diluted with water, it forms a good acid drink in febrile diseases, especially typhus. Dr. Duncan frequently gave it, with unequivocal advantage, in the low typhus occurring in the suburbs of Edinburgh. In syphilis, and in the chronic hepatitis of India, it is highly extolled by Dr. Scott, formerly of Bombay. It cannot be depended upon as a remedy in syphilis, but is often an excellent adjuvant in worn out constitutions, either to prepare the system for the use of mercury, or to lessen the effects of that metal on the constitution, by supporting the tone of the system. Externally, it has been used with advantage as a lotion to fetid ulcers, of the strength of about twelve minims to the pint of water. As nitric acid dissolves both uric acid and the phosphates, it was supposed to be applicable to those cases of gravel in which the uric acid and the phosphates are mixed; but subsequent experience has not confirmed its practical efficacy in such cases. Nevertheless, when the sabulous deposite depends upon certain states of disordered digestion, this acid may prove serviceable by restoring the tone of the stomach The dose is from five to twenty minims in three fluidounces or more o. water, given three or four times a day.

Nitric acid, in a state of vapour, is considered useful for destroying contagion; and hence is employed in purifying gaols, hospitals, and ships, and other infected places. It is prepared for use by the extemporaneous decomposition of nitre by sulphuric acid. Half an ounce of powdered nitre is put into a saucer, which is placed in an earthen dish containing heated sand. On the nitre, two drachms of sulphuric acid are then poured, and the nitric acid fumes are immediately disengaged. The quantities just indicated are considered to be sufficient for disinfecting a cubic space of ten feet. Fumigation in this manner was first introduced by an English physician, Dr. Carmichael Smyth, who received from the British Parliament for its discovery, a reward of five thousand pounds. It may well be doubted whether the nitric acid, as a disinfector, is at all comparable to chlorine; and since the introduction of the chlorides of lime and soda as disinfecting agents, this gas has been brought into so manageable a form, that its use may very well supercede that of every other agent employed with similar intentions. (See *Chloride of Lime* and *Chloride of Soda*, in the Appendix.)

Properties as a Poison. Nitric acid, in its concentrated state, is the mineral poison most frequently taken for the purpose of self-destruction. Immediately on swallowing it, there are produced burning heat in the mouth, œsophagus, and stomach; acute pain; disengagement of gas; abundant eructations; nausea and hiccup. Soon after, there occur repeated and excessive vomiting, the vomited matter having a peculiar odour and taste; tumefaction of the abdomen, with exquisite tenderness; a feeling of coldness on the surface; horripilations; icy coldness of the extremities; small depressed pulse; horrible anxieties; continual tossings and contortions; extreme thirst. The breath becomes extremely fetid, and the countenance exhibits a complete picture of suffering. The cases are almost uniformly fatal. The best remedies are repeated doses of magnesia as an antidote, mucilaginous drinks in large quantities, olive or almond oil in very large doses, emollient fomentations, and clysters. Until magnesia can be obtained, an immediate resort to a solution of soap in large amount will be proper.

Off. Prep. of Nitric Acid. Acidum Nitricum Dilutum, *Lond.*, *Dub.;* Acidum Nitromuriaticum, *Dub.;* Antimonii Oxydum Nitromuriaticum, *Dub.;* Argenti Nitras, *U. S.*, *Lond.;* Bismuthi Subnitras, *U. S.*, *Lond.;* Hydrargyri Oxidum Rubrum, *U. S.*, *Lond.;* Spiritus Ætheris Nitrici, *Lond.*, *Dub.;* Unguentum Acidi Nitrici, *Dub.*

Off. Prep. of Nitrous Acid. Acidum Nitrosum Dilutum, *Ed.;* Spiritus Ætheris Nitrosi, *Ed.;* Unguentum Acidi Nitrosi, *Ed.* B.

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ACIDUM SULPHURICUM. *U.S.*, *Lond.*, *Ed.*

Sulphuric Acid.

Off. Syn. ACIDUM SULPHURICUM VENALE, *Dub.*

Oil of vitriol; Acide sulphurique, *Fr.;* Vitriolöl, Schwefelsäure, *Germ.;* Acido solforico, *Ital.;* Acido sulfurico, *Span.*

Sulphuric acid is placed in the Materia Medica of all the Pharmacopœias noticed in this work, as an article to be obtained from the wholesale manufacturer. Its officinal sp. gr., as prescribed in the U.S. Pharm., is 1.8485; in the London and Dublin, 1.850; and in the Edinburgh, 1.845. These differences in density are so slight, that a virtual agreement may be assumed to exist in the strength of the different officinal acids.

Preparation. Sulphuric acid is obtained by burning sulphur, mixed with one-eighth of its weight of nitre, over a stratum of water, contained in a chamber lined with sheet lead. If the sulphur were burnt by itself, the product would be sulphurous acid, which contains only two-thirds as much oxygen as sulphuric acid. The object of the nitre is to furnish, by its decompositon, the requisite additional quantity of oxygen. To understand the process, it is necessary to bear in mind that nitric acid contains five, sulphuric acid three, sulphurous acid two, nitric oxide two, hyponitrous acid three, and nitrous acid four equivalents of oxygen, combined with one equiv. of their several radicals. One equiv. of sulphur decomposes one equiv. of nitric acid of the nitre, and becomes one equiv. of sulphuric acid, which combines with the potassa of the nitre to form sulphate of potassa. In the mean time, the nitric acid, by furnishing three equiv. of oxygen to form the sulphuric acid, is converted into one equiv. of nitric oxide, which is evolved. This gas, by combining with two equiv. of the oxygen of the air, immediately becomes nitrous acid vapour, which diffuses itself throughout the leaden chamber. While these changes are taking place, the remainder of the sulphur is undergoing combustion, and filling the chamber with sulphurous acid gas. The nitrous and sulphurous acid gases, being thus intermingled in the chamber, react on each other: one equiv. of nitrous acid, by the aid of moisture, unites with one equivalent of sulphurous acid, so as to form a crystalline compound consisting of one equiv. of sulphuric acid, and one equiv. of hyponitrous acid, united to a portion of water. This compound falls into the water of the chamber, and instantly undergoes decomposition. The sulphuric acid dissolves in the water, and the hyponitrous acid, resolved, at the moment of its extrication, into nitrous acid and nitric oxide, escapes with effervescence. The nitrous acid thus set free, as well as that reproduced by the nitric oxide uniting with the oxygen of the atmosphere, again reacts with the sulphurous acid and humidity, and gives rise to a second portion of the crystalline compound, which undergoes the same changes as the first. In this manner the nitric oxide performs the part of a carrier of oxygen from the air of the chamber to the sulphurous acid, to convert the latter into sulphuric acid. The residue of the process consists of sulphate of potassa and is sold to the alum makers.

Preparation on the Large Scale. The leaden chambers vary in size, but are generally from thirty to thirty-two feet square, and from sixteen to twenty feet high. The floor is slightly inclined to facilitate the drawing off of the acid, and covered to the depth of several inches with water. There are several modes of burning the mixture of sulphur and nitre, and otherwise conducting the process, but that pursued in France is as follows. Near to one of the sides of the chamber, and at about a foot from its bottom, a cast iron tray is placed over a furnace, resting on the ground, with a chimney having no communication with the chamber, and its mouth opening externally. On this tray the mixture is placed, being introduced by a square opening, which may be shut by means of a sliding door, and the lower side of which is level with the surface of the tray. The door being shut, the fire is gradually raised in the furnace, whereby the sulphur is inflamed, and the products already spoken of are generated. When the combustion is over, the door is raised, and the sulphate of potassa removed. A fresh portion of the mixture is then placed on the tray, and the air of the chamber is renewed by opening a door and valve situated at its opposite side. Next, the several openings are closed, and the fire is renewed. These operations are repeated with fresh portions of the mixture, every three or four hours, until the water at the bottom of the chamber has reached the sp. gr. of about 1.2. It is then drawn off and transferred to leaden boilers, where it is boiled down until it has nearly attained the sp. gr. of 1.5. Its further concentration requires a higher heat than lead can bear, and accordingly, it is transferred to large glass or platinum retorts, where it is evaporated as long as water distils over. This water is slightly acid, and is thrown back into the chamber. When the acid is fully concentrated, opaque grayish-white vapours arise, and the process, by their appearance, is known to be finished. The acid is allowed to cool, and transferred to large demijohns of green glass, called carboys, which, for greater security, are surrounded with straw or wicker-work, and packed in tubs, or flour barrels sawed in two.

The English method of manufacturing this acid, as described by Mr. Parkes, is somewhat different. The mixture is usually spread on iron or leaden plates, resting on stands of lead within the chamber, placed at some distance from each other, and a foot or two above the surface of the water. The sulphur is then lighted by means of a hot iron, and the doors closed. If the sulphur and nitre be well mixed, the combustion will last for thirty or forty minutes; and in three hours from the time of lighting, the condensation of the gases having in that interval been completed, the doors are thrown open for fifteen or thirty minutes, to admit fresh atmospheric air, and to allow time for the residuary nitrogen to escape, preparatory to the next burning. These operations are repeated with fresh charges of the mixture, every four hours, both night and day, until the water has attained the requisite acid impregnation, when it is transferred to leaden boilers, and otherwise treated as already explained. The quantity of the charge for each burning is determined by the size of the chamber, allowing one pound of the mixture for every three hundred cubic feet of atmospheric air which it may contain.

As, in the manufacture of sulphuric acid, the nitre is the most expensive article, many plans have been resorted to, for the purpose of obtaining the nitrous acid at a cheaper rate. One plan is to procure it by the igneous decomposition of nitre and dried sulphate of iron, and to pass it into a chamber already filled with sulphurous acid and atmospheric air, but devoid of water. After an interval of several hours, when the chamber is fully charged with the several gases, a certain quantity of steam from a boiler is allowed to enter with great force. This causes the formation of the sulphuric acid, which precipitates with the condensed steam on the floor of the chamber. Another method of obtaining nitrous acid is by treating molasses or starch with common nitric acid. In this case, the manufacturer obtains oxalic acid as a collateral product, which serves to diminish his expenses.

In most of the manufactories of sulphuric acid in France, nitrate of soda has been substituted for nitre. The advantages of the former salt are its greater cheapness, and the circumstance of its containing a larger proportional quantity of nitric acid.

The above explanations relate to the mode of preparing common sulphuric acid; but there is another kind known on the continent of Europe by the name of the *fuming sulphuric acid of Nordhausen*, so called from its properties, and a place in Saxony where it is largely manufactured. This acid is obtained by distilling dried sulphate of iron in large stoneware retorts, heated nearly to whiteness, and connected with receivers of glass or stoneware. The acid distils over, and peroxide of iron is left behind in the form of colcothar.

The process for making sulphuric acid by the combustion of sulphur with nitre, was first mentioned by Lemery, and afterwards put in practice by an English physician of the name of Ward. As practised by him, the combustion was conducted in very large glass vessels. About the year 1746, the great improvement of the leaden chambers was introduced by Dr. Roebuck, an eminent physician of Birmingham, where the first apparatus of this kind was erected; and in consequence of it, the acid immediately fell to one-fourth of its former price, and was introduced into many arts, from which it had been previously excluded by its expense. At the present day, immense quantities are manufactured in Great Britain, amounting, in 1823, according to a calculation of Mr. Parkes, to upwards of six millions of pounds.

In the United States, the first manufactory of this acid was established in Philadelphia by the late Mr. John Harrison. At present there are manufactories in successful operation in most of the large cities of the union. These supply the entire demand of the United States, no foreign acid being imported at the present day. The wholesale price of the acid varies from three and a half to four and a half cents per pound.

Properties. Sulphuric acid is a dense, colourless, inodorous liquid, having an oleaginous appearance, and possessing strong corrosive qualities. On the living fibre, it acts as a powerful caustic. Rubbed in small quantity between the fingers, it has an unctuous feel, in consequence of its dissolving the cuticle. In the liquid form, it always contains water, which is essential to its existence. When pure and as highly concentrated as possible, its sp. gr. is 1.8485, a fluidounce weighing a small fraction over fourteen drachms. Whenever its density exceeds this, the presence of sulphate of lead, or of some other impurity is indicated. It boils at 620°, and freezes at 15°. When diluted, its boiling point is lowered. When of the sp. gr. 1.78, it freezes at above 32°; and hence it is hazardous for manufacturers to keep an acid of that strength in glass vessels in cold weather, as they are liable to burst. With salifiable bases, it forms a numerous class of salts called sulphates. It acts powerfully on organic bodies, whether vegetable or animal, depriving them of the elements of water, developing charcoal, and turning them black. A small piece of cork or wood dropped into the acid, will, on this principle, render it of a dark colour. When diluted with pure water, it ought to remain limpid, and when heated sufficiently in a platinum spoon, it should evaporate without residue. When present in small quantities in solution, it is detected unerringly by muriate of baryta, which causes a precipitate of sulphate of baryta. The most usual impurities in it are the sulphates of potassa and lead, the former derived from the residue on the iron tray, the latter from the leaden boilers in which the acid is concentrated. It occasionally contains nitre, which is added to render dark acid colourless. These impurities often amount to 3 or 4 per cent. The commercial acid cannot be expected to be absolutely pure, but, when properly manufactured, it ought not to contain more than one per cent. of impurity. The fixed impurities are discoverable by evaporating a portion of the suspected acid, when they will remain. If sulphate of lead be present, the acid will become turbid by dilution.

Sulphuric acid, as it occurs in commerce and in the shops, is often under its standard strength; and hence it becomes important to know how much liquid sulphuric acid of the standard specific gravity, and of dry acid, is contained in an acid of any given density. The following table, drawn up from careful experiments by Dr. Ure, gives information of this kind. The mode of using it, is first to ascertain the specific gravity of any acid by experiment; and then, opposite to this specific gravity in the table, will be found the percentage of standard liquid acid and of dry acid contained in it.

Table of the Quantity of Liquid Sulphuric Acid of Sp. Gr. 1.8485, *and of Dry Acid, in* 100 *parts of Dilute Acid at different Densities.*

Sp. Gr.	*Liq. Acid in* 100	*Dry Acid in* 100	*Sp. Gr.*	*Liq. Acid in* 100	*Dry Acid in* 100	*Sp. Gr.*	*Liq. Acid in* 100	*Dry Acid in* 100	*Sp. Gr.*	*Liq. Acid in* 100	*Dry Acid in* 100
1.8485	100	81.54	1.6520	75	61.15	1.3884	50	40.77	1.1792	25	20.38
1.8475	99	80.72	1.6415	74	60.34	1.3788	49	39.95	1.1706	24	19.57
1.8460	98	79.90	1.6321	73	59.52	1.3697	48	39.14	1.1626	23	18.75
1.8439	97	79.09	1.6204	72	58.71	1.3612	47	38.32	1.1549	22	17.94
1.8410	96	78.28	1.6090	71	57.89	1.3530	46	37.51	1.1480	21	17.12
1.8376	95	77.46	1.5975	70	57.08	1.3440	45	36.69	1.1410	20	16.31
1.8336	94	76.65	1.5868	69	56.26	1.3345	44	35.88	1.1330	19	15.49
1.8290	93	75.83	1.5760	68	55.45	1.3255	43	35.06	1.1246	18	14.68
1.8233	92	75.02	1.5648	67	54.63	1.3165	42	34.25	1.1165	17	13.86
1.8179	91	74.20	1.5503	66	53.82	1.3080	41	33.43	1.1090	16	13.05
1.8115	90	73.39	1.5390	65	53.00	1.2999	40	32.61	1.1019	15	12.23
1.8043	89	72.57	1.5280	64	52.18	1.2913	39	31.80	1.0953	14	11.41
1.7962	88	71.75	1.5170	63	51.37	1.2826	38	30.98	1.0887	13	10.60
1.7870	87	70.94	1.5066	62	50.55	1.2740	37	30.17	1.0809	12	9.78
1.7774	86	70.12	1.4960	61	49.74	1.2654	36	29.35	1.0743	11	8.97
1.7673	85	69.31	1.4860	60	48.92	1.2572	35	28.54	1.0682	10	8.15
1.7570	84	68.49	1.4760	59	48.11	1.2490	34	27.72	1.0614	9	7.34
1.7465	83	67.68	1.4660	58	47.29	1.2409	33	26.91	1.0544	8	6.52
1.7360	82	66.86	1.4560	57	46.48	1.2334	32	26.09	1.0477	7	5.71
1.7245	81	66.05	1.4460	56	45.66	1.2260	31	25.28	1.0405	6	4.89
1.7120	80	65.23	1.4360	55	44.85	1.2184	30	24.46	1.0336	5	4.08
1.6993	79	64.42	1·4265	54	44.03	1.2108	29	23.65	1.0268	4	3.26
1.6870	78	63.60	1.4170	53	43.22	1.2032	28	22.83	1.0206	3	2.446
1.6750	77	62.78	1.4073	52	42.40	1.1956	27	22.01	1.0140	2	1.63
1.6630	76	61.97	1.3977	51	41.58	1.1876	26	21.20	1.0074	1	0.8154

The only way to obtain pure sulphuric acid is by distillation. Owing to the high boiling point of this acid, the operation is rather precarious, in consequence of the danger of the fracture of the retort, from the sudden concussions to which the boiling acid gives rise. Dr. Ure recommends that a retort of the capacity of from two to four quarts be used in distilling a pint of acid. This is connected, by means of a wide glass tube three or four feet long, with a receiver surrounded with cold water. All the vessels must be perfectly clean, and no luting is employed. The retort is then to be cautiously heated by a small furnace of charcoal. It is useful to put into the retort a few sharp-pointed pieces of glass, or slips of platinum foil, with a view to diminish the shocks produced by the acid vapour. The distilled product ought not to be preserved until a dense grayish-white vapour is generated, the appearance of which is the sign that the real concentrated acid is coming over. If this vapour should not immediately appear, it shows that the acid subjected to distillation is not of full strength, and the distilled product, until the point of utmost concentration is attained, will be an acid water.

The Dublin College gives a formula for purifying the commercial acid by distillation. (See *Acidum Sulphuricum Purum.*) This formula, however, is unnecessary, as the commercial sulphuric acid, diluted with water, whereby it is purified from sulphate of lead, is sufficiently pure for medical use, while the pure distilled acid is only necessary in conducting experiments of research. The strong acid is not convenient for medicinal use, and hence a formula for a diluted acid is given in the United States Pharmacopœia, following the example of the British Colleges. (See *Acidum Sulphuricum Dilutum.*)

Incompatibles. Sulphuric acid is incompatible with most metals; with salifiable bases and their carbonates; with most salts, effecting their decomposition; with alcohol, which it converts into ether; with all organic substances, which it chars or otherwise decomposes; and with vegetable astringent infusions.

Composition. The ordinary liquid acid of the sp. gr. 1.8485, consists of one equivalent of dry acid 40.1, and one equiv. of water 9=49.1; and the dry acid, of one equiv. of sulphur 16.1, and three equiv. of oxygen 24=40.1. The liquid acid of Nordhausen has a density as high as 1.89 or 1.9, and consists of two equiv. of dry acid, and one equiv. of water. This acid is particularly adapted to the purpose of dissolving indigo for dyeing the Saxon blue. When heated gently in a retort, connected with a dry and refrigerated receiver, dry or anhydrous sulphuric acid distils over, and the common liquid acid remains behind. The anhydrous acid under 64° is in the form of small colourless crystals, resembling asbestos. It is tenacious, difficult to cut, and may be moulded in the fingers like wax, without acting on them. Exposed to the air, it emits a thick opaque vapour of an acid smell. Above 64° it is a liquid, very nearly of the density of 2. It has so strong an affinity for water, that when thrown into that liquid, it causes a hissing noise, like that produced by quenching red-hot iron.

Medical Properties. Sulphuric acid is tonic, antiseptic, and refrigerant. Internally it is always administered in a dilute state. (For its medical properties in this form, see *Acidum Sulphuricum Dilutum.*) Externally it is sometimes employed as a caustic; but, from its liquid form, it is very inconvenient for this purpose. It is applied also as an ointment mixed with lard, in swellings of the knee-joint and other affections, in the proportion of a drachm to an ounce. (See *Unguentum Acidi Sulphurici*, Dub.) Charpie, corroded by it, forms a good application to gangrene.

Toxicological Properties. The symptoms of poisoning by this acid are the following:—Burning heat in the throat and stomach; extreme fetidness of the breath; nausea, and excessive vomitings of black or reddish matter; excruciating pains in the bowels; difficulty of breathing; extreme anguish; a feeling of cold on the skin; great prostration; constant tossing; convulsions, and death. The intellectual faculties remain unimpaired. Frequently the uvula, palate, tonsils, and other parts of the fauces, are covered with black or white sloughs. The treatment consists in the administration of large quantities of magnesia, or if this is not at hand, of a solution of soap. The safety of the patient depends upon the greatest promptitude in the application of the remedies. After the poison has been neutralized, mucilaginous and other mild drinks must be taken in large quantities.

Uses in the Arts. Sulphuric acid is more used in the arts than any other acid. It is employed to obtain nearly all other acids; to extract soda from common salt; to make alum and sulphate of iron, when these salts command a good price, and the acid is cheap; to dissolve indigo; to prepare skins for tanning; and lastly, to prepare phosphorus, sulphuric ether, the chlorides of mercury, chloride of lime or bleaching salt, sulphate of zinc, and sulphate of magnesia. The arts of bleaching and dyeing principally cause its consumption.

Off. Prep. Acidum Sulphuricum Aromaticum, *U.S., Ed., Dub.;* Acidum Sulphuricum Dilutum, *U.S., Lond., Ed.;* Acidum Sulphuricum Purum, *Dub.;* Ferri Sulphas, *U.S., Lond., Ed., Dub.;* Hydrargyri Persulphas, *Dub.;* Hydrargyri Sulphas Flavus, *U.S., Ed., Dub.;* Magnesiæ Sulphas Purum, *Dub.;* Potassæ Bisulphas, *Dub.;* Quiniæ Sulphas, *U.S.;* Solutio Sulphatis Cupri Composita, *Ed.;* Unguentum Acidi Sulphurici, *Dub.;*

Unguentum Sulphuris Compositum, *U.S.;* Zinci Sulphas, *U.S., Lond., Ed., Dub.* B.

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ACIDUM TARTARICUM. *U.S., Lond., Dub.*

Tartaric Acid.

Acide tartrique, *Fr.;* Weinsteinsäure, *Germ.;* Acido tartarico, *Ital., Span.*

Tartaric acid is officinal in all the Pharmacopœias commented on in this work, except the Edinburgh. It is placed among the preparations by the London and Dublin Colleges; but stands more properly, in the United States Pharmacopœia, in the Materia Medica, as an article to be purchased from the wholesale manufacturer. It is extracted from tartar, a peculiar substance which concretes on the inside of wine-casks, being deposited there during the fermentation of the wine. Tartar, when purified, is the cream of tartar of the shops, and is found to be a supersalt, consisting of two equivalents of tartaric acid, and one equiv. of potassa. It is, therefore, in correct chemical language, a bitartrate of potassa. (See *Potassæ Supertartras.*)

Tartaric acid was first obtained in a separate state by Scheele in 1770. The process consists in saturating the excess of acid in the bitartrate of potassa with carbonate of lime, and decomposing the resulting soluble tartrate of lime by sulphuric acid, which precipitates in combination with the lime, and liberates the tartaric acid. The equivalent quantities are one equiv. of bitartrate, and one equiv. of carbonate of lime. The process, when thus conducted, furnishes the second equivalent or excess of acid only of the bitartrate. The other equivalent may be procured by decomposing the neutral tartrate of potassa remaining in the solution after the precipitation of the tartrate of lime, by muriate of lime in excess. By double decomposition, muriate of potassa will be formed, and a fresh portion of tartrate of lime, which latter is to be decomposed by sulphuric acid in the same manner as the first portion. The process, when thus conducted, will furnish, in theory, twice as much tartaric acid as when the excess of acid only is saturated and set free.

Preparation on the Large Scale. The mode of obtaining this acid on the large scale is as follows. Mix intimately, by grinding in a mortar and passing through a sieve, 100 parts, of bitartrate of potassa (cream of tartar) with 26½ parts of pulverized chalk. Throw the mixture, by spoonfuls, into 8 or 10 times its weight of boiling water, waiting until the effervescence has ceased, before every fresh addition. Examine the solution by litmus paper, and if not neutral, make it so, by the addition of a little chalk. Wash the tartrate of lime with abundance of cold water, and add to it a quantity of sulphuric acid equal in weight to the chalk employed, and diluted with from 10 to 16 times its weight of water. Agitate the mixture frequently for 24 hours, and then test a small portion of the clear solution for sulphuric acid by acetate of lead. A precipitate will be formed, which is either tartrate of lead, or a mixture of tartrate and sulphate of lead. If the former, it will dissolve entirely in dilute nitric acid; if the latter, only partially, as the sulphate of lead is insoluble in this acid. If a slight excess of sulphuric acid should be indicated, it is of no consequence; but if the excess be considerable, it must be removed by a fresh addition of chalk. On the other hand, an excess of tartrate of lime, which interferes very much with the crystallization of the tartaric acid, must be decomposed by adding a small quantity of sulphuric acid. The clear liquor, separated from the sulphate of lime, is concentrated by evaporation to the consistence of syrup, and allowed to crystallize. Repeated solutions and crystallizations are necessary to get the crystals white. The mode of ascertaining the quantity of chalk consumed, is to weigh out more than is necessary in the process, and, after the saturation has been completed, to weigh what is left. If the neutral tartrate of potassa be also converted into tartrate of lime in the manner already explained, the quantity of sulphuric acid for decomposition must be doubled. Sometimes the bitartrate of potassa is decomposed by lime, in which case the whole of the tartaric acid present is converted into tartrate of lime at one operation; but the caustic potassa, also liberated, by dissolving the tartrate of lime formed and preventing it from precipitating, renders this process ineligible.

The reader is now prepared to understand the formulæ of the London and Dublin Colleges.

"Take of supertartrate of potassa two pounds and a half; boiling distilled water three gallons; prepared chalk a pound; sulphuric acid a pound. Boil the supertartrate of potassa with two gallons of the distilled water, and add by degrees the prepared chalk, until effervescence shall have ceased. Set the mixture by, that the tartrate of lime may subside. Pour off the solution, and wash the tartrate of lime repeatedly with distilled water, until it comes off tasteless. Then pour on the sulphuric acid, diluted with a gallon of boiling distilled water, and set aside for twenty-four hours, occasionally agitating the mixture. Filter the liquor, and evaporate it in a water-bath, that crystals may form."—*Lond.*

"Take of bitartrate of potassa, reduced to powder, ten parts; prepared chalk, four parts; sulphuric acid seven parts; water, one hundred and twenty parts. Mix the bitartrate of potassa with one hundred parts of hot water, and gradually add the prepared chalk; then, as soon as the effervescence shall have ceased, pour off the supernatant liquor. Wash the residual tartrate of lime, until it becomes tasteless. Into the clear decanted liquor, drop as much of the water of muriate of lime as may be sufficient to throw down the tartrate of lime. Let this also be washed with water, and mixed with the former deposite. Then add the sulphuric acid, diluted with twenty parts of water, and, employing frequent agitation, digest the mixture with a *medium* heat during three days. Pour off the supernatant acid fluid, and wash out the acid from the sediment. Let the liquors, including the first acid liquor and the washings, evaporate with a gentle heat to the point of crystallization. Let the crystals, purified by repeated solutions and crystallizations, be kept in a stopped glass vessel."—*Dub.*

These processes agree in the proportions of bitartrate and chalk employed. The quantity of chalk directed appears to be excessive, being two-fifths of the weight of the bitartrate; whereas, by theory, a portion only one-fourth the weight of the latter is required; and making every allowance for impurities, one-third would be amply sufficient. The plan of dissolving the bitartrate in boiling water, and then adding the chalk, is not an eligible one. It is better to mix them together according to the plan given by Dr. Henry, as described in the beginning of this article, and to throw the mixture by spoonfuls at a time into boiling water. In this way, less water is necessary, and less excess of chalk is required, as less of it escapes decomposition. Instead of prescribing the quantity of chalk, it would, perhaps, have been an improvement, if the Colleges above quoted, had directed a quantity "sufficient for saturation." The London College uses the proper quantity of sulphuric acid, the best authorities directing that this acid should equal in weight the chalk employed, where the excess of acid only in the bitartrate is obtained. The Dublin College, it is perceived, decomposes the neutral tartrate, and would obtain, if no loss occurred, a double quantity of tartaric acid. The London College, however, makes no use of the solution of the neutral tartrate; but to prevent waste it ought to be evaporated so as to furnish soluble tartar. The process of the Dublin College is inaccurately quoted by the authors of the London and Edinburgh Dispensatories. Dr. A. T. Thomson has misapprehended the effect of the muriate of lime employed in the Dublin formula.

Nearly all the tartaric acid consumed in the United States is of domestic manufacture. Occasionally, however, a few kegs are imported from Bordeaux or Marseilles, when the article happens to command a good price.

Properties. Tartaric acid is a white crystallized solid in the form of irregular six-sided prisms. Sometimes two opposite sides of the prism become very much enlarged, so as to cause the crystals to present the appearance of tables. It is unalterable in the air, and possesses a strong acid taste, which becomes agreeable when the acid is sufficiently diluted with water. It is soluble in five or six times its weight of cold, and twice its weight of boiling water. It is also soluble in alcohol. A weak solution undergoes spontaneous decomposition by keeping, becoming covered with a mouldy pellicle. In the form of crystals, it always contains combined water, from which it cannot be separated without previous combination with a base. In uniting with bases, it has a remarkable tendency to form double salts, several of which constitute important medicines. When subjected to heat, it yields, in addition to the usual products of the destructive distillation of vegetable matter, a peculiar acid, called *pyrotartaric.* It is distinguished from all other acids by forming a precipitate, consisting of bitartrate of potassa, when added to a salt of that alkali. The most usual impurity in it is sulphuric acid, which is detected by the solution affording, with muriate of baryta, a precipitate insoluble in excess of muriatic acid.

Tartaric acid is incompatible with salifiable bases and their carbonates; with salts of potassa, with which it produces a crystalline precipitate of bitartrate; and with the salts of lime and of lead, with which it also forms precipitates. It consists, when dry, of two equivalents of hydrogen 2, four equiv. of carbon 24.48, and five equiv. of oxygen 40=66.48; and when crystallized, of one equiv. of dry acid 66.48, and one equiv. of water 9=75.48.

Medical Properties. Tartaric acid, being cheaper than citric acid, forms, when dissolved in water and sweetened, a good substitute for lemonade. It is very much used in medicine to form acid refrigerant drinks and effervescing draughts. What are called *soda powders*, consist of twenty-five grains of tartaric acid, and half a drachm of bicarbonate of soda, put up in separate papers. When used, the acid and salt are dissolved in separate portions of water, and the solutions mixed and drank in a state of effervescence. These powders furnish a good substitute for soda water. Tartaric acid is also a constituent in the gentle aperient called *Seidlitz powders.* These consist of a mixture of two drachms of tartrate of potassa and soda, (Rochelle salt,) and two scruples of bicarbonate of soda, put up in a white paper, and thirty-five grains of tartaric acid contained in a blue one. The contents of the white paper are dissolved in about half a pint of water, to which those of the blue paper are added; and the whole is taken in a state of effervescence. The excess of acid renders the medicine more pleasant, without injuring its aperient quality. This acid, when powdered and dried by a gentle heat, and then mixed in due proportion with the bicarbonate of soda, forms a good effervescing powder, a teaspoonful of which, stirred into a tumbler of water, forms the dose. The mixture must be kept in well stopped vials. The neutralizing power of tartaric acid is about the same as that of citric acid.

Tartaric acid is not employed in any officinal preparation. B.

ACONITUM, *U. S.*

Aconite.

"Aconitum Neomontanum. Folia. *The leaves.*" *U. S.*

Off. Syn. ACONITI FOLIA. Aconitum Napellus. Folia. *Lond.;* ACONITI NAPELLI FOLIA. *Ed.;* ACONITUM PANICULATUM. Folia. *Dub.*

Aconit, *Fr.;* Eisenhut, Mönchskappe, *Germ.;* Aconito, Napello, *Ital.;* Aconito, *Span.*

Aconitum. *Sex. Syst.* Polyandria Trigynia.—*Nat. Ord.* Ranunculaceæ.

Gen. Ch. Calyx none. *Petals* five, the highest arched. *Nectaries* two, peduncled, recurved. *Pods* three or five. *Willd.*

The plants belonging to this genus are herbaceous, with divided leaves, and violet or yellow flowers disposed in spikes, racemes, or panicles. In the French Codex three species are adopted as officinal, the *A. Anthora*, *A. Cammarum*, and *A. Napellus* of Linnæus. The London and Edinburgh Colleges recognise only the *A. Napellus*, which was erroneously supposed to be the plant employed by Störck, who introduced the medicine into notice. The U. S. Pharmacopœia follows Willdenow in adopting the *A. neomontanum* as the plant described by Störck. The Dublin College recognises only the *A. paniculatum* of De Candolle. This botanist, in his Prodromus, divides the genus *Aconitum* into four sections—*Anthora*, *Lycoctonum*, *Camarum*, and *Napellus*. The *A. paniculatum* belongs to the third of these divisions; and the particular plant, believed to have been used by Störck, is a variety of this species, distinguished in the Prodromus as the *Störckianum*. De Candolle is probably correct. The A. neomontanum of Willdenow for which the honour has been generally claimed, is, according to Geiger, possessed of little acrimony, and is therefore very different from Störck's plant, which is represented as extraordinarily acrid. It is, however, of little consequence which was used by Störck, as most of the species possess similar virtues, and one is frequently substituted for another in the shops. Geiger states that he has found none equal to the A. Napellus in acrimony; and this may, therefore, perhaps, be considered as the most efficacious. Only one species of aconite is indigenous in this country—the *A. uncinatum.* Most of the others are natives of the Alpine regions of Europe and Siberia. Those employed in medicine appear to be indiscriminately called by English writers *wolfsbane* or *monkshood.*

Aconitum Napellus. Linn. *Flor. Suec. ed.* 1755, p. 186.—*A. neubergense.* De Cand. *Syst. veg.* i. 373.—*A variabile neubergense.* Hayne, *Darstel. und Beschreib.* &c., xii. 14. This is a perennial herbaceous plant, with a turnip-shaped or fusiform root, and an erect, round, smooth, leafy stem, which is usually simple, and rises from two to four feet, sometimes even six or eight feet in height. The leaves are alternate, petiolate, divided almost to the base, from two to four inches in diameter, deep green upon their upper surface, light green beneath, somewhat rigid, and more or less smooth and shining on both sides. Those on the lower part of the stem have long footstalks and five or seven divisions, the upper, short footstalks and three or five divisions. The divisions are narrow at their base, but widen in the form of a wedge towards their summit, and present two or three lobes, which extend nearly or quite to the middle. The lobes are cleft or toothed, and the laciniæ or teeth are linear or linear-lanceolate and pointed. The flowers are of a dark violet-blue colour, large and beautiful, and are borne at the summit of the stem upon a thick, simple, straight, erect, spike-like raceme, beneath which, in the cultivated plant, several smaller racemes rise from the axils of the upper leaves. Though without calyx, they have two small calycinal stipules situated on the peduncle within a few lines of the flower. The petals are five, the upper helmet-shaped and beaked, nearly hemispherical, open or closed, the two lateral roundish and internally hairy, the two lower oblong-oval. They enclose two pedicled nectaries, of which the spur is capitate, and the lip bifid and revolute. The fruit consists of three, four, or five podlike capsules.

The plant is abundant in the mountainous forests of France, Switzerland, and Germany. It is also cultivated in the gardens of Europe, and has been introduced into this country as an ornamental flower. All parts of it are acrid and poisonous; but the leaves only are officinal. They should be collected when the flowers begin to appear, or shortly before.

Properties. The fresh leaves have a faint narcotic odour, which is most sensible when they are rubbed. Their taste is at first bitterish and herbaceous, afterwards burning, very acrid, and durable. When long chewed, they inflame the tongue. The dried leaves have a similar taste, but the acrid impression commences later. Their sensible properties and medicinal activity are impaired by long keeping. They should be of a green colour and neither musty nor tasteless. Those parcels should always be rejected which are destitute of acrimony. Other species of aconite are often substituted, and, if possessed of the same sensible properties, without inconvenience. The analysis of aconite, though attempted by several chemists, has not been satisfactorily accomplished. Bucholz obtained from the fresh herb of the A. neomontanum, resin, wax, gum, albumen, extractive, lignin, malate and citrate of lime and other saline matters, besides 83.33 per cent. of water. During the bruising of the herb, he experienced headach, vertigo, &c., though water distilled from it produced no poisonous effect. It has been rendered probable by the researches of Geiger and Hesse, that there are two active principles in aconite, one easily destructible, upon which the acrimony depends, the other but slightly acrid, having alkaline properties, and capable of exerting a powerful narcotic influence over the system. For the latter, the name of *aconitin* has been proposed; which, however, if the claim of the principle to the rank of an alkali be admitted, should be changed to *aconitia.* Hesse obtained it from the dried leaves by a process similar to that employed in procuring atropia. (See *Belladonna.*) Dr. Turnbull recommends the following process, as affording it in a state of considerable purity. The alcoholic extract of the root prepared by a cautious evaporation is to be treated with water, and the aqueous solution filtered. To the filtered solution, water of ammonia is to be added drop by drop, so long as any precipitate is produced. When the precipitate has subsided, the supernatant liquid is to be drawn off, and the residual mass washed repeatedly with small quantities of cold water, and then dried. (*Lond. Med. and Surg. Journ., Feb.* 1835.) *Aconitia* is white, uncrystallizable, inodorous, and of a bitter, somewhat acrid taste, though its acrimony is much weaker and less permanent than that of the plant itself. Unless very pure, it is apt to be associated with a portion of the acrid principle, from which it can be wholly freed only by repeatedly dissolving it in a diluted acid, and precipitating by means of an alkali. It is fusible without being volatile, is scarcely soluble in water, but very soluble in alcohol, and is dissolved by ether. It neutralizes the acids, producing with them salts which appear to be uncrystallizable. In its operation on the animal system, it is exceedingly powerful; one-fiftieth of a grain having sufficed to kill a small bird. (*Annalen der Pharmacie*, 1833.) Dr. Turnbull states that twenty drops of an alcoholic solution containing one grain to the drachm, put into the mouth of a guinea pig, produced death in a few minutes. Peschier has announced the existence of a peculiar acid in aconite, which he calls *aconitic acid.*

Medical Properties and Uses. Aconite was well known to the ancients as a powerful poison, but was first employed as a medicine by Baron Störck of Vienna, whose experiments with it were published in the year 1762. In moderate doses it excites the circulation, increases the perspiratory and urinary discharge, and exercises considerable influence over the nervous system. When given in poisonous doses, it occasions burning heat of the stomach, thirst, violent nausea, vomiting, purging, severe gastric and intestinal spasms, vertigo, mania, convulsions, and death. Its constitutional effects are also experienced when it is applied to the surface of a wound. Orfila inferred from his experiments, that, while it irritates the part to which it is applied, it also enters the circulation and acts powerfully on the nervous system, particularly the brain, giving rise to a species of mental alienation. Dissection reveals inflammation of the stomach and bowels, with engorgement of the brain and lungs. Aconite has been employed in rheumatism, gout, scrofula, secondary syphilis, scirrhus and cancer, certain cutaneous diseases, amaurosis, paralysis, epilepsy, intermittent fever, and other complaints. Its highest reputation has perhaps been as a remedy in obstinate rheumatism, in which complaint it has been very successful in the hands of the German practitioners. Professor Fouquier, who experimented largely with it in the *Hôpital de la Charité*, found little advantage from its use, except as a diuretic in passive dropsy. It may be administered in powder, extract, or tincture. The dose of the powdered leaves is one or two grains; that of the extract from half a grain to a grain, to be repeated twice or three times a day, and gradually increased till the effects of the medicine are experienced. The tincture may be prepared by macerating two ounces of the dried leaves in a pint of alcohol, and may be given in the dose of ten or fifteen drops, to be gradually augmented. Aconite is little used by American practitioners.

Aconitia has been employed externally in neuralgia, and in gouty and rheumatic affections. According to Dr. Turnbull, it excites a sensation of heat and prickling in the part, succeeded by a feeling of numbness and constriction, which lasts several hours; but little or no vascular irritation is produced. An alcoholic solution containing one grain in a fluidrachm, or an ointment composed of two grains of aconitia, six drops of alcohol, and a drachm of lard, may be applied, in small portions, by friction, to the part affected, three or four times a day; the proportion of the alkali being gradually increased as the occasion may demand. Care should be taken that the cuticle be not abraded, as dangerous constitutional effects might otherwise result.

Off. Prep. Extractum Aconiti, *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

ADEPS. *U.S.*

Lard.

"Sus scrofa. Adeps curata. *The lard.*" *U.S.*

Off. Syn. ADEPS PRÆPARATA. *Lond.;* ADEPS SUILLUS. *Ed.;* ADEPS SUILLUS PRÆPARATUS. *Dub.*

Axonge, Graisse, Saindoux, *Fr.;* Schweineschmalz, *Germ.;* Grasso di porco, Lardo, *Ital.;* Manteca de puerco, Lardo, *Span.*

Lard is the prepared fat of the hog. The London and Dublin Colleges give processes for its preparation; but as in this country it is purchased by the druggists already prepared, the introduction of any officinal directions into our Pharmacopœia was deemed superfluous. The adipose matter of the omentum and mesentery, and that which surrounds the kidneys, are usually employed; though the subcutaneous fat is said to afford lard of a firmer consistence. In the crude state it contains membranes and vessels, and is more or less contaminated with blood, from all which it must be freed before it can be fit for use. For this purpose, the fat, having been deprived as far as possible, by the hand, of membranous matter, is cut into pieces, washed with water till the liquid ceases to be coloured, and then melted, usually with a small portion of water, in a copper or iron vessel, over a slow fire. The heat is continued till all the moisture is evaporated, which may be known by the transparency of the melted fat, and the absence of crepitation when a small portion of it is thrown into the fire. Care should be taken that the heat is not too great, as otherwise the lard might be partially decomposed, acquire a yellow colour, and become acrid. The process is completed by straining the fluid through linen, and pouring it into suitable vessels, in which it concretes upon cooling.

Lard, as offered for sale, often contains common salt, which renders it unfit for pharmaceutic purposes. To free it from this, the Dublin College directs that it be melted with twice its weight of boiling water, the mixture well agitated and set aside to cool, and the fat then separated.

Properties. Lard is white, inodorous, with little taste, of a soft consistence at ordinary temperatures, fusible at about 100° F., insoluble in water, partially soluble in alcohol, dissolved and decomposed by the stronger acids, and converted into soap by union with the alkalies. According to Braconnot, it contains, in 100 parts, 62 of *elaïn* or the liquid principle of oils, and 38 of *stearin* or the concrete principle. Most fats and oils, whether of animal or vegetable origin, are composed of these two ingredients, upon the relative proportion of which their consistence respectively depends. They may be obtained separate by the action of boiling alcohol, which on cooling deposites the stearin, and yields the elaïn upon evaporation. Another method is to compress fat, or oil congealed by cold, within the folds of bibulous paper. The elaïn is absorbed by the paper, and may be separated by compression under water; the stearin remains.

Elaïn resembles oil in appearance, is colourless when pure, congeals at 20° F., may be evaporated unchanged *in vacuo*, has little odour and a sweetish taste, is insoluble in water but soluble in boiling alcohol, and consists of carbon, oxygen, and hydrogen.

Stearin is white, concrete, fusible at 111° F., volatilizable unchanged *in vacuo*, partly volatilized and partly decomposed when heated in a retort, insipid, inodorous, slightly soluble in alcohol, insoluble in water, and composed, like the former principle, of carbon, hydrogen, and oxygen.*

Exposed to the air, lard absorbs oxygen and becomes rancid. It should therefore be kept in well closed vessels, or procured fresh when wanted for use. In the rancid state it is irritating to the skin, and sometimes exercises an injurious reaction on substances mixed with it. Thus the ointment of iodide of potassium, which is white when prepared with fresh lard, is said to be more or less yellow when the lard employed is rancid.

Medical Properties and Uses. Lard is emollient, and is occasionally employed by itself in frictions, or in connexion with poultices to preserve their soft consistence; but its chief use is in pharmacy as an ingredient of ointments and cerates. It is frequently added to laxative enemata.

Off. Prep. Ceratum Simplex, *U.S.;* Unguentum Aquæ Rosæ, *U.S;* Unguentum Cetacei, *Dub.;* Unguentum Simplex, *U.S., Dub.* W.

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# ALCOHOL. *U. S.*

Alcohol.

SPIRITUS RECTIFICATUS. *Lond., Dub.;* ALCOHOL FORTIUS. *Ed.*

Spirit of wine; Alcool, Esprit de vin, *Fr.;* Rectificirter Weingeist, *Germ.;* Alcoole, Acquavite rettificata, *Ital.;* Alcohol, Espiritu rectificado de vino, *Span.*

Considerable confusion prevails in the nomenclature adopted in the different Pharmacopœias, to express the various pharmaceutical strengths of the liquid, which in its pure state is known to the chemist under the name of alcohol. The London and Dublin Colleges have adopted three strengths of this substance; while the Edinburgh and United States Pharmacopœias have admitted only two. The following table presents a synoptic view of the names and strengths of the alcohol according to these different authorities; assuming those preparations to be identical, the specific gravities of which approach to an equality.

	U. S.	*Lond.*	*Dub.*	*Ed.*
Highest off. strength.	—	Alcohol. Sp. gr. 0.815	Alcohol. Sp. gr. 0.810	—
Medium do.	Alcohol. Sp. gr. 0.835	Spiritus Rectificatus. Sp. gr. 0.835	Spiritus Rectificatus. Sp. gr. 0.840	Alcohol Fortius. Sp. gr. 0.835
Lowest do.	Alcohol Dilutum.	Spiritus Tenuior. Sp. gr. 0.930.	Spiritus Tenuior. Sp. gr. 0.919	Alcohol Dilutius. Sp. gr. 0.935

Thus it is perceived that the officinal "Alcohol" of the United States Pharmacopœia, is a rectified spirit of the sp. gr. 0.835; while the spirit under the same officinal name, of the London and Dublin Colleges, is much stronger. It is certainly to be regretted that the same name has been applied to the substance of such different strengths, as it leads to confusion. Our principal object, however, in this article, is to describe the *alcohol* of the United States Pharmacopœia, corresponding to the London and Dublin *Spiritus Rectificatus*, and the Edinburgh *Alcohol Fortius;* and we shall introduce incidentally the formulæ for the stronger spirit of the London and Dublin Colleges, called by the same name. The *Alcohol Dilutum*, and the corresponding preparations of the British Pharmacopœias, will be considered in their appropriate place, in the second part of this work. (See *Alcohol Dilutum.*)

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* From recent experiments by M. Le Canu it appears, that the concrete portion of animal oils to which the name of stearin has hitherto been applied, consists, in fact, of two distinct principles, distinguished by their different fusibility and solubility in ether. For that which is most fusible and most soluble in ether, he proposes the name of *margarin,* while for the other he retains the appellation before given to the mixture of the two.

Alcohol, in the chemical sense, is a peculiar liquid, generated for the most part in vegetable juices and infusions by a peculiar fermentation, called the vinous or alcoholic. The liquids which have undergone it are called vinous liquors, and are of various kinds. Thus the fermented juice of the grape is called wine; of the apple, cider; and the fermented infusion of malt, beer. All these, and many others, are vinous liquors, and for that reason contain alcohol.

With regard to the nature of the liquids susceptible of the vinous fermentation, one general character runs through them all, however various they may be in other respects, that, namely, of containing sugar in some form or other. It is found further, that after they have undergone the vinous fermentation, the sugar they contained has, either wholly or in part, disappeared, and that the only new products are alcohol which remains in the liquid, and carbonic acid which escapes during the process; and these, when taken together, are found to be equal in weight to the sugar which has disappeared. It is hence inferred, with much appearance of probability, that sugar is the subject matter of the vinous fermentation, and that during the change, it is resolved into alcohol and carbonic acid. Additional facts in support of this view, will be adduced under the head of the composition of alcohol.

Sugar, however, will not undergo the vinous fermentation by itself; but requires to be dissolved in water, subjected to the influence of a ferment, and kept at a certain temperature. Accordingly, sugar, water, the presence of a ferment, and the maintenance of an adequate temperature, may be deemed the prerequisites of the vinous fermentation. The water acts by giving fluidity, and the ferment and temperature operate by commencing and maintaining the chemical changes. The precise manner in which the ferment operates in commencing the reaction is not known. Neither has it been certainly ascertained whether it is a peculiar vegetable principle, or whether a number of distinct vegetable substances are capable of acting in a similar way. As a general rule, substances containing nitrogen, such as gluten, albumen, caseous matter, &c., possess the property of inducing the vinous fermentation. The proper temperature ranges from 60° to 90°.

Certain vegetable infusions, as those of potatoes and rice, though consisting almost entirely of starch, are, nevertheless, capable of undergoing the vinous fermentation, and form seeming exceptions to the rule that sugar is the only substance susceptible of this fermentation. The apparent exception is explained by the circumstance, that starch is susceptible of a spontaneous change which converts it into sugar. How this change takes place is not well known, but it is designated by some authors as the *saccharine* fermentation. Thus Kirchoff proved, that if a mixture of gluten from flour, and starch from potatoes, be put into hot water, the starch will be converted into sugar. When, therefore, starch is apparently converted into alcohol by fermentation, it is supposed that during the change it passes through the intermediate state of sugar.

Alcohol, being the product of the vinous fermentation, necessarily exists in all vinous liquors, and may be obtained from them by distillation. Formerly it was supposed that these liquors did not contain alcohol, but were merely capable of furnishing it in consequence of a new arrangement of their ultimate constituents, the result of the heat applied in the distillation. Brande, however, disproved this idea, by showing that alcohol may be obtained from all vinous liquors without the application of heat, and, therefore, must preexist in them. His method consists in precipitating their acid and colouring matter by subacetate of lead, and separating the water by carbonate of potassa. Gay-Lussac and Donovan have proved the same fact. According to the former, litharge in fine powder is the best agent for precipitating the colouring matter.

In vinous liquors, the alcohol is diluted with abundance of water, and associated with colouring matter, volatile oil, extractive, and various acids and salts, their nature and number depending upon the source of the liquor. In purifying it we take advantage of its volatility, which enables us to separate it by distillation, combined with some of the principles of the vinous liquor employed, and more or less water. The distilled product of vinous liquors forms the different varieties of ardent spirit of commerce. When obtained from wine, it is called brandy; from fermented molasses, rum; from cider, malted barley, or rye, whiskey; from malted barley and rye-meal with hops, and rectified from juniper berries, Holland gin; from malted barley, rye, or potatoes, rectified with turpentine, common gin; and from fermented rice, arrack. These spirits are of different strengths, that is, contain different proportional quantities of alcohol, and have various peculiarities by which they are distinguished by the palate. Their strengh is accurately judged of by the specific gravity, which is always inversely proportional to their concentration. When they have a sp. gr. of 0.920 they are designated in commerce by the term proof spirit. If lighter than this, they are said to be above proof; if heavier, below proof. *Proof spirit* may be considered as corresponding with the average strength of the weaker alcohol used in pharmacy. (See *Alcohol Dilutum.*)

Proof spirit is still very far from being pure; being a dilute alcohol, containing about half its weight of water, together with essential oil and other foreign matters. It may be further purified and strengthened by redistillation, or *rectification* as it is called. Whiskey is the spirit usually employed for this purpose, and from every hundred gallons, between fifty-seven and fifty-eight will be obtained, of the average strength of rectified spirit, (sp. gr. 0.835.) corresponding to the *alcohol* of the U. S. Pharm., and the *Spiritus Rectificatus* of the Lond. and Dub. Colleges. When this is once more cautiously distilled, it will be further purified from water, and attain the sp. gr. of about 0.825, which is the lightest spirit which can be obtained by ordinary distillation. It still, however, contains eleven per cent. of water. In the mean while, the spirit, by these repeated distillations, becomes more and more freed from essential oil.

If it be desired to obtain alcohol of still greater concentration, it is necessary to avail ourselves of certain substances which have a powerful affinity for water. Of this nature are lime, carbonate of potassa, and chloride of calcium. These being mixed with the rectified spirit, unite with water and sink, while the purer spirit floats above, and may be separated by decantation or distillation. By availing themselves of substances of this nature, the London and Dublin Colleges are enabled to produce their strongest spirit, which they denominate *alcohol.* (See tabular view page 52.) The following are the processes which they adopt.

ALCOHOL, (sp. gr. 0.815,) *Lond.*—"Take of rectified spirit, *a gallon;*

subcarbonate of potassa, *three pounds.* To the spirit add *a pound* of the subcarbonate of potassa, previously heated to 300°, and allow the mixture to macerate for twenty-four hours, with frequent agitation. Then, having poured off the spirit, add to it the remaining subcarbonate, heated to the same degree. Finally, by means of a water-bath, distil the alcohol, and keep it in stopped bottles."

Alcohol, (sp. gr. 0.810,) *Dub.*—"Take of rectified spirit, *a gallon;* pearlashes, dried and still hot, *three pounds and a half;* muriate of lime, dried, *a pound.* Add the pearlashes in powder to the spirit, and let the mixture digest in a covered vessel for seven days, shaking it frequently. Draw off the supernatant spirit, and mix with it the muriate of lime. Lastly, distil, with a moderate heat, until the mixture in the retort begins to thicken."

The alkali used in both these processes, is the carbonate of potassa, (improperly called subcarbonate in the London formula,) which is a very deliquescent salt, and consequently well fitted to abstract the water from alcohol. The chloride of calcium, (dry muriate of lime,) used by the Dublin College, is an agent of a similar kind, and for the same reason. The London College uses the carbonate only, and that in two portions; while the second addition of the Dublin, is of chloride of calcium. The Dublin formula is to be preferred, on account of the superior *deaquating* power of chloride of calcium, which, moreover, from its solubility in alcohol, comes in contact, as Dr. Barker of Dublin very justly remarks, with every particle of the water.

Alcohol, thus obtained, still contains a small proportion of water, to separate which, it must be very carefully and repeatedly distilled from chloride of calcium, or some other substance having a powerful attraction for water. When thus treated, it is finally brought to the sp. gr. 0.796, at the temp. of 60°, which is considered its point of greatest concentration, as it is now entirely free from water of dilution. In this state, it is called *absolute alcohol.*

Absolute alcohol may be obtained, on a small scale, by the ingenious method of Mr. Graham of Edinburgh. It consists in supporting a cup, containing a few ounces of common alcohol, over a shallow basin, covered to a small depth with lime. The whole is placed on the plate of an air-pump under a shallow receiver, and the air exhausted. The exhaustion causes a mixed atmosphere of the vapours of alcohol and water to arise, the latter of which only is absorbed by the lime. Its absorption permits fresh portions of watery vapour to be formed, which are absorbed in their turn, and the emission and absorption of the aqueous vapour continue so long as any water remains in the alcohol. In the mean time, the permanent atmosphere of alcoholic vapour effectually represses its fresh formation. Common spirit may thus be brought to the state of absolute alcohol in the course of five or six days. A good way for ascertaining when all the water has been removed, is to drop into the liquid a piece of anhydrous baryta, which will remain unchanged if the alcohol be free from water; otherwise it will fall to powder.

Properties. Alcohol is a colourless transparent liquid, of a penetrating, agreeable odour, and a burning and highly pungent taste. When free from water of dilution, its sp. gr. is 0.796, at the temp. of 60°. Its density progressively increases by dilution, so that its sp. gr. is an index of its strength. When of the sp. gr. 0.820, its boiling point is at 176°; this point being always lower in proportion as the alcohol is stronger. Its specific gravity, as a vapour, is 1.60 compared with air. It has never been congealed, having been exposed to the greatest artificial cold yet produced, (91° below zero,) without losing its liquidity. On account of this property, it is used in thermometers for measuring very low temperatures. It is inflammable, and burns without smoke or residue, the products being water, and carbonic acid. Its flame is of a bluish colour when the alcohol is strong; but yellowish, when weak. It combines with water in all proportions, forming mixtures which are variously denominated in commerce. Its value depends upon the quantity of absolute alcohol which it contains; and as this is greater in proportion as the sp. gr. of any sample is less, it is found convenient to take the density in estimating its purity. This is done by instruments with bulbs and long stems, called hydrometers, which, by being allowed to float in the spirit, sink deeper into it in proportion as it is lighter. Any given hydrometer strength corresponds with some particular specific gravity; and by referring to tables constructed for the purpose, the percentage of absolute alcohol indicated in each case is at once shown. The following table constructed by Lowitz and improved by Thomson, is of this kind. We have placed in notes, referring to their respective specific gravities in the table, the names of the different officinal spirits, whereby the percentage of absolute alcohol is indicated which they severally contain.

Table of the Specific Gravity of different mixtures of Absolute Alcohol and Distilled Water, at the Temp. of 60°.

100 *Parts.*		*Sp. Gr. at 60°.*	100 *Parts.*		*Sp. Gr. at 60°.*	100 *Parts.*		*Sp. Gr. at 60°.*	100 *Parts.*		*Sp. Gr. at 60°.*
Alc.	*Wat.*		*Alc.*	*Wat.*		*Alc.*	*Wat.*		*Alc.*	*Wat.*	
100	0	.796	76	24	.857	52	48	.912	28	72	.962
99	1	.798	75	25	.860	51	49	.915	27	73	.963
98	2	.801	74	26	.863	50	50	.917	26	74	.965
97	3	.804	73	27	.865	49	51	.920¶	25	75	.967
96	4	.807	72	28	.867	48	52	.922	24	76	.968
95	5	.809*	71	29	.870	47	53	.924	23	77	.970
94	6	.812	70	30	.871	46	54	.926	22	78	.972
93	7	.815†	69	31	.874	45	55	.928	21	79	.973
92	8	.817	68	32	.875	44	56	.930**	20	80	.974
91	9	.820	67	33	.879	43	57	.933	19	81	.975
90	10	.822	66	34	.880	42	58	.935††	18	82	.977
89	11	.825‡	65	35	.883	41	59	.937	17	83	.978
88	12	.827	64	36	.886	40	60	.939	16	84	.979
87	13	.830	63	37	.889	39	61	.941	15	85	.981
86	14	.832	62	38	.891	38	62	.943	14	86	.982
85	15	.835§	61	39	.893	37	63	.945	13	87	.984
84	16	.838	60	40	.896	36	64	.947	12	88	.986
83	17	.840‖	59	41	.898	35	65	.949	11	89	.987
82	18	.843	58	42	.900	34	66	.951	10	90	.988
81	19	.846	57	43	.903	33	67	.953	9	91	.989
80	20	.848	56	44	.904	32	68	.955	8	92	.990
79	21	.851	55	45	.906	31	69	.957	7	93	.991
78	22	.853	54	46	.908	30	70	.958	6	94	.992
77	23	.855	53	47	.910	29	71	.960			

Alcohol is capable of dissolving a great number of substances; as for example, sulphur and phosphorus in small quantity; iodine; ammonia; and potassa, soda, and lithia in the caustic state, but not as carbonates. Among vegetable substances, it is a solvent of the organic vegetable alkalies, sugar, mannite, camphor, resins, balsams, volatile oils, and soap. It dissolves the fixed oils sparingly, except castor oil, which is abundantly soluble. It acts on most acids, forming ethers with some, and effecting the solution of others. All deliquescent salts are soluble in alcohol, except carbonate of potassa; while the efflorescent salts, and those either insoluble or sparingly soluble in water, are mostly insoluble in it.

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* Alcohol, *Dub.* (nearly.) † Alcohol, *Lond.* ‡ Lightest spirit obtained by ordinary distillation. § Alcohol, *U.S.;* Spiritus Rectificatus, *Lond.;* Alcohol Fortius, *Ed.* ‖ Spiritus Rectificatus. *Dub.* ¶ Spiritus Tenuior, *Dub.* (nearly.) ** Spiritus Tenuior, *Lond.* †† Alcohol Dilutius, *Ed.*

It is capable of combining, in the solid form, with different substances, so as to form definite compounds, which, from their analogy to hydrates, are called *alcoates.*

Composition. Alcohol consists of three equivalents of hydrogen 3, two equiv. of carbon 12.24, and one equiv. of oxygen 8 = 23.24; or in volumes, of three volumes of hydrogen, two volumes of the vapour of carbon, and half a volume of oxygen. These ultimate constituents are considered by the generality of chemists to be so combined as to form one equiv. of olefiant gas 14.24, and one equiv. of water 9; corresponding to one volume of olefiant gas, and one volume of the vapour of water, which are condensed into one volume of alcohol vapour.

Some chemists view the equivalent number of alcohol as double that given above, or 46.48. Those who take this view consider it as a compound of one equiv. of etherine 28.48, and two equiv. of water 18; or in volumes, of one volume of etherine and two volumes of the vapour of water, condensed into two volumes. *Etherine* is a highly volatile liquid, discovered by Faraday, consisting of four equiv. of carbon 24.48, and four of hydrogen 4 = 28.48; or of four volumes of vapour of carbon, and four of hydrogen condensed into one volume of its vapour. It is hence obvious that etherine is *isomeric* with olefiant gas, and only differs from it in having an equivalent exactly double, and in being, in a state of vapour, twice as dense.

It has been already stated, that in the vinous fermentation, sugar is converted into alcohol and carbonic acid. Now sugar consists, according to the analysis of Dr. Prout, of one equiv. of hydrogen, one of carbon, and one of oxygen; and carbonic acid consists of one equiv. of carbon and two of oxygen. Bearing in mind these data, as also the composition of alcohol, it is easy to explain how sugar may be resolved into alcohol and carbonic acid. If, in order to equalize the hydrogen in the sugar and alcohol respectively, we suppose three equiv. of sugar to be the subject-matter of decomposition, we shall have present in that quantity of it, three equiv. of hydrogen, three of carbon, and three of oxygen. Now, if from these we take one equiv. of carbon and two of oxygen—that is, carbonic acid—we shall have left three equiv. of hydrogen, two of carbon, and one of oxygen, or the exact constituents of alcohol. Thus the composition of the several substances concerned most fully confirms the statement previously made as to the subject-matter and products of the vinous fermentation.

Medical Properties, &c. Alcohol is a very powerful diffusible stimulant. It is the intoxicating ingredient in all spirituous and vinous liquors, including under the latter term porter, ale, and cider, and every liquid in short which has undergone the vinous fermentation. In its pure state it is never used in medicine; but diluted to various degrees, it forms a menstruum for many remedies. In a diluted state, and taken in small quantity, it excites the system, renders the pulse full, communicates additional energy to the muscles, and gives temporary exaltation to the mental faculties. In some states of acute disease, characterized by excessive debility, it is a valuable remedy. In the form of brandy, it is frequently given in the sinking stages of typhus with advantage. Other kinds of ardent spirit are occasionally administered, and each is supposed to have its peculiar qualities.

Thus, according to Dr. Paris, brandy may be esteemed simply cordial and stomachic; rum, heating and sudorific; and gin and whiskey, diuretic. Physicians should be on their guard not to prescribe alcoholic remedies in chronic diseases, whether alone or in the form of tinctures, for fear of begetting habits of intemperance in their patients. Externally, alcohol is sometimes applied to produce cold by evaporation, or to stimulate when its evaporation is repressed.

As an article of daily and dietetic use, alcoholic liquors produce the most deplorable consequences. Besides the moral degradation which they cause, their habitual use gives rise to dyspepsia, hypochondriasis, visceral obstructions, dropsy, paralysis, and not unfrequently mania.

Alcohol is extensively employed by perfumers and distillers, in making essences and cordials. In the arts it is used to form drying varnishes, and in chemistry, as an important analytic agent. Being a powerful antiseptic, it is very useful in preserving anatomical preparations.

Effects as a Poison. When taken in a large quantity, alcohol, in the form of various ardent spirits, produces a true apoplectic state, and occasionally speedy death. The face becomes livid or pale, the respiration stertorous, the mouth frothy; and sense and feeling are more or less completely lost. Where the danger is imminent, an emetic may be administered. The affusion of cold water is often very useful. As a counter-poison, acetate of ammonia has been asserted to act with advantage.

Pharmaceutic Uses. Alcohol is very extensively employed as a pharmaceutic agent. Either in its rectified state, or diluted with water, it is used in the formation of all the tinctures, spirits, ethers, and resinous extracts; is added to the vinegars, some of the medicated waters, and one or more of the decoctions and infusions, to assist in their preservation; serves as a vehicle or diluent of certain active medicines, as in the *Alcohol Ammoniatum*, and *Acidum Sulphuricum Aromaticum;* and is employed for various incidental purposes connected with its solvent power.

Off. Prep. Alcohol Dilutum, *U.S.* B.

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ALETRIS. *U.S. Secondary.*

Star Grass.

"Aletris farinosa. Radix. *The root.*" *U.S.*

ALETRIS. *Sex. Syst.* Hexandria Monogynia.—*Nat. Ord.* Asphodeleæ.

Gen. Ch. *Corolla* tubular, six-cleft, wrinkled, persistent. *Stamens* inserted into the base of the segments. *Style* triangular, separable into three. *Capsule* opening at the top, three-celled, many seeded. *Bigelow.*

Aletris farinosa. Willd. *Sp. Plant.* ii. 183; Bigelow, *Am. Med. Bot.* iii. 92. This is an indigenous perennial plant, the leaves of which spring immediately from the root, and spread on the ground in the form of a star. Hence have originated the popular names of *star grass*, *blazing star*, and *mealy starwort*, by which it is known in different parts of the country. The leaves are sessile, lanceolate, entire, pointed, very smooth, longitudinally veined, and of unequal size, the largest being about four inches in length. From the midst of them a flower stem rises, one or two feet in height, nearly naked, with remote scales, which sometimes become leaves. It terminates in a slender scattered spike, the flowers of which stand on very short pedicels, and have minute bractes at the base. The calyx is wanting. The corolla is tubular, oblong, divided at the summit into six spreading segments, of a white colour, and presenting, when old, a mealy or rugose appearance on the outside. The plant is found in almost all parts of the U. States, growing in fields and about the borders of woods, and flowering in June and July.

Properties. The root, which is the officinal portion, is small, crooked, branched, blackish externally, brown within, and intensely bitter. The bitterness is extracted by alcohol, and the tincture becomes turbid upon the addition of water. The decoction is moderately bitter; but much less so than the tincture. It affords no precipitate with the salts of iron.—(*Bigelow.*)

Medical Properties. In small doses the root appears to be simply tonic, and may be employed advantageously for similar purposes with other bitters of the same class. When largely given it produces nausea. The powder may be administered as a tonic in the dose of ten grains. W.

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ALLIUM. *U.S.*

Garlick.

"Allium sativum. Bulbus. *The Bulb.*" *U.S.*

Off. Syn. ALLII RADIX. Allium sativum. Radix. *Lond.;* ALLII SATIVI RADIX. *Ed.;* ALLIUM SATIVUM. Bulbus. *Dub.*

Ail, *Fr.;* Knoblauch, *Germ.;* Aglio, *Ital.;* Ajo, *Span.*

Allium. *Sex. Syst.* Hexandria Monogynia.—*Nat. Ord.* Asphodeleæ.

Gen. Ch. *Corolla* six-parted, spreading. *Spathe* many-flowered. *Umbel* crowded. *Capsule* superior. *Willd.*

This is a very extensive genus, including more than sixty species, most of which are European. Of the nine or ten indigenous to this country, none are employed. Of the European species, several have been used from a very early period, both as food and medicine. Three only are officinal; the *A. sativum*, or garlick; the *A. Cepa*, or onion; and the *A. Porrum*, or leek. The U. S. Pharmacopœia has adopted only the *A. sativum*, and to this we shall confine our observations in the present place, simply stating that few genera present a greater resemblance in medical and sensible properties among the various species that compose them, than the present.

Allium sativum. Willd. *Sp. Plant.* ii. 68; Woodv. *Med. Bot.* p. 749, t. 256. This is a perennial plant, and like all its congeners, bulbous. The bulbs are numerous, and enclosed in a common membranous covering, from the base of which the fibres that constitute the proper root descend. The stem is simple, and rises about two feet in height. The leaves are long, flat, and grass-like; and sheath the lower half of the stem. At the termination of the stem is a cluster of flowers and bulbs mingled together, and enclosed in a pointed spathe which opens on one side and withers. The flowers are small and white, and make their appearance in July. This species of garlick grows wild in Sicily, Italy, and the South of France; and is cultivated in all civilized countries.

The part employed as well for culinary purposes as in medicine, is the bulb, which is properly designated in the U. S. Pharmacopœia. The London and Edinburgh Colleges erroneously direct the root, which, though in ordinary language confounded with the bulb, is, in fact, botanically speaking, composed of the fibres that proceed from its base. The bulbs are dug up with a portion of the stem attached, and, having been dried in the sun, are tied together in bunches, and thus brought into market. They are said to lose by drying nine parts of their weight out of fifteen, with little diminution of their sensible properties. This species of Allium is commonly called *English garlick*, to distinguish it from those which grow wild in our fields and meadows.

Properties. Garlick, as found in the shops, is of a shape somewhat spherical, flattened at the bottom, and drawn towards a point at the summit, where a portion of the stem several inches in length projects. It is covered with a white, dry, membranous envelope, consisting of several delicate laminæ, within which the small bulbs are arranged around the stem, having each a distinct coat. These small bulbs, which in common language are called *cloves* of garlick, are usually five or six in number, of an oblong shape, somewhat curved, and in their interior are whitish, moist, and of a fleshy consistence. They have a disagreeable pungent odour, so peculiar as to have received the name of *alliaceous*. Their taste is bitter and acrid. This smell and taste, though strongest in the bulb, are found to a greater or less extent in all parts of the plant. They depend on an *essential oil* which is very volatile, and may be obtained by distillation, passing over with the first portions of water. It is of a yellow colour, exceedingly pungent odour, strong and acrid taste; is heavier than water; and when applied to the skin produces much irritation, and sometimes even blisters. Besides this oil, fresh garlick, according to Cadet-Gassicourt, contains in 1406 parts, 520 of mucilage, 37 of albumen, 48 of fibrous matter, and 801 of water. Bouillon-Lagrange mentions among its constituents, sulphur, a saccharine matter, and a small quantity of fecula. The fresh bulbs yield upon pressure nearly a fourth part of juice, which is highly viscid, and so tenacious as to require dilution with water before it can be easily filtered. When dried it serves as a lute for porcelain. It has the medical properties of the bulbs. Water, alcohol, and vinegar extract the virtues of garlick. Boiling, however, if continued for some time, renders it inert.

Medical Properties and Uses. The use of garlick as a medicine and condiment, ascends to the highest antiquity. When taken internally, its active principle is very speedily absorbed, and penetrating throughout the system, becomes sensible in the breath and various secretions. Even externally applied, as for example to the soles of the feet, it imparts its peculiar odour to the breath, urine, and perspiration, and according to some writers, may be tasted in the mouth. Its effects upon the system are those of a general stimulant. It quickens the circulation, excites the nervous system, promotes expectoration in a debilitated state of the vessels of the lungs, produces diaphoresis or diuresis according as the patient is kept hot or cool, and acts upon the stomach as a tonic and carminative. Applied to the skin, it is irritant and rubefacient, and moreover exercises to a greater or less extent, its peculiar influence upon the system, in consequence of its absorption. Moderately employed, it is beneficial in enfeebled digestion and flatulence; and is habitually used as a condiment by many who have no objection to an offensive breath. It has been given with advantage in chronic catarrh, humoral asthma, and other pectoral affections in which the symptoms of inflammation have been subdued, and a feeble condition of the vessels remains. Some physicians have highly recommended it in old atonic dropsies and calculous disorders; and it has been employed in the treatment of intermittents. It is said also to be an excellent anthelmintic. If taken too largely, or in excited states of the system, it is apt to occasion gastric irritation, flatulence, hemorrhoids, headach, and fever. As a medicine, it is at present more used externally than inwardly. Bruised and applied to the feet, it acts very beneficially as a revulsive in disorders of the head; and is especially useful in the febrile complaints of children, by quieting restlessness and producing sleep. Its juice mixed with oil, or the garlick itself bruised and steeped in spirits, is frequently used as a liniment in infantile convulsions, and other cases of spasmodic or nervous disorder among children. The same application has been made in cases of cutaneous eruption. A clove of garlick, or a few drops of the juice introduced into the ear, are said to prove highly efficacious in atonic deafness; and the bulb, bruised and applied in the shape of a poultice above the pubis, has sometimes restored action to the bladder in cases of retention of urine from debility of that organ. In the same shape it has been recommended as a resolvent in indolent tumours, and may perhaps prove beneficial by stimulating the absorbents.

Garlick may be taken in the form of pill; or the clove may be swallowed either whole, or cut into pieces of a convenient size. Its juice is also frequently administered mixed with sugar. The infusion in milk was at one time highly recommended, and the syrup is officinal. The dose in substance is from half a drachm to a drachm, or even two drachms of the fresh bulb. That of the juice is half a fluidrachm.

Off. Prep. Syrupus Allii, *U.S.* W.

ALLIUM CEPA. Bulbus. *Dub.*

Onion.

Ognon, *Fr.;* Zwiebel-Lauch, *Germ.;* Cipolla, *Ital.;* Cebolla, *Span.*

Allium. See ALLIUM, *U. S.*

Allium Cepa. Willd. *Sp. Plant.* ii. 80. The onion is a perennial bulbous plant, with a naked scape, swelling towards the base, exceeding the leaves in length, and terminating in a simple umbel of white flowers. The leaves are hollow, cylindrical, and pointed.

The original country of this species of Allium is unknown. The plant has been cultivated from time immemorial, and is now diffused over the whole civilized world. All parts of it have a peculiar pungent odour, but the bulb only is used.

Properties. This is of various size and shape, ovate, spherical, or flattened, composed of concentric fleshy and succulent layers, and covered with dry membranous coats, which are reddish, yellowish, or white, according to the variety. It has, in a high degree, the characteristic odour of the plant, with a sweetish and acrid taste. Fourcroy and Vauquelin obtained from it a white acrid volatile oil holding sulphur in solution, albumen, much uncrystallizable sugar and mucilage, phosphoric acid both free and combined with lime, acetic acid, citrate of lime, and lignin. The expressed juice is susceptible of the vinous fermentation.

Medical Properties and Uses. The onion is stimulant, diuretic, expectorant, and rubefacient. Taken moderately, it increases the appetite and promotes digestion, and is much used as a condiment; but in large quantities it is apt to cause flatulence, gastric uneasiness, and febrile excitement. The juice is occasionally given, made into syrup with sugar, in infantile catarrhs and croup, in the absence of much inflammatory action. It is also recommended in dropsy and calculous disorders. Deprived of its essential oil by boiling, the onion becomes a mild esculent; and it is much more used as food than as medicine. Roasted and split, it is sometimes applied as an emollient cataplasm to suppurating tumours. W.

ALOE. *U.S.*

Aloes.

"Aloe Spicata. Extractum. *The extract.*" *U.S.*

Off. Syn. ALOES SPICATÆ EXTRACTUM. *Lond.;* ALOES EXTRACTUM. Ex variis alöes speciebus. *a.* ALOE HEPATICA. *b.* ALOE SOCOTORINA. *Ed.;* ALOE HEPATICA, ex A. vulgari. ALOE SOCOTORINA, ex A. spicatâ. *Dub.*

Suc d'aloès, *Fr.;* Aloe, *Germ., Ital.;* Aloë, *Span.;* Musebber, *Arab.*

Most of the species belonging to the genus Aloe are said to yield a bitter juice, which has all the properties of the officinal aloes. It is impossible, from the various and sometimes conflicting accounts of writers, to determine exactly from which of the species the drug is in all instances actually derived. The *Aloe spicata*, however, is generally acknowledged to be an abundant source of it; and the *Aloe vulgaris*, and *Aloe Soccotrina* of Haworth or *Aloe vera* of Miller, are usually ranked among the medicinal species. In Loudon's Encyclopædia of plants are also mentioned the *A. purpurascens* of Haworth, and the *A. aborescens** of the Hortus Kewensis; and others are, without doubt, occasionally resorted to. The U.S. Pharmacopœia and that of London at present recognise only the *Aloe spicata.* We shall confine ourselves to a description of this species, noticing others only incidentally, when speaking of the products which they afford.

ALOE. *Sex. Syst.* Hexandria Monogynia.—*Nat. Ord.* Asphodeleæ.

Gen. Ch. *Corolla* erect, mouth spreading, bottom nectariferous. *Filaments* inserted into the receptacle. *Willd.*

Aloe spicata. Willd. *Sp. Plant.* ii. 185. This species of aloes was described by Thunberg; but we cannot ascertain that it has been figured. The stem is round, three or four feet high, about four inches in diameter, and leafy at the summit. The leaves are spreading, subverticilate, about two feet long, broad at the base, gradually narrowing to the point, channeled or grooved upon their upper surface, and with remote teeth upon their edges. The flowers are of a scarlet colour and bell-shaped, and spread horizontally in very close spikes. They contain a large quantity of purple honey juice. The spiked aloes is a native of Southern Africa, growing near the Cape of Good Hope, and, like all the other species of this genus, preferring a sandy soil. In some districts of the colony it is found in great abundance, particularly at Zwellendam, near Mossel bay, where it almost covers the surface of the country. As it grows spontaneously, and requires not the least culture, the Hottentots find an occupation accordant with their indolent habits, in collecting and preparing the juice. The process is exceedingly simple. According to Thunberg, the leaves are cut off and so arranged, that the lowest serves as a gutter to convey the juice, which runs from the wounded surface, into a suitable recipient. In other accounts, it is stated, that the juice is extracted by pressure from the leaves previously cut in pieces. The liquor is inspissated by heat in iron cauldrons, and when of a proper consistence is poured into casks which contain from one hundred to three hundred pounds.

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* The *A. vulgaris*, *A. Soccotrina*, *A. purpurascens*, and *A. arborescens*, are considered by some botanists as mere varieties of the *A. perfoliata* of Linnæus.

Commercial History and Varieties. Three varieties of aloes reach the markets of this country; that of the Cape of Good Hope, the Socotrine, and the Hepatic.

1. The Cape Aloes, which is by far the most abundant, and by its extraordinary cheapness and excellent qualities, promises to supersede the other varieties, has been imported chiefly if not exclusively from G. Britain, as no direct trade has till recently been carried on between the U. States and the Cape of Good Hope. It has sometimes been confounded with the Socotrine from which, however, it differs very considerably in appearance and sensible properties. By the German writers it is called *shining aloes.* When freshly broken, it has a very dark olive colour approaching to black, presents a smooth bright almost glassy surface, and if held up to the light appears translucent at its edges. The small fragments also are semi-transparent, and have a tinge of yellow or red mixed with the deep olive of the opaque mass. The same tinge is sometimes observable in the larger pieces. The powder is of a fine greenish-yellow colour, and being generally more or less sprinkled over the surface of the pieces as they are kept in the shops, gives them a somewhat yellowish appearance. The odour is strong and disagreeable, but not nauseous. It has not the slightest mixture of the aromatic. Cape aloes, when perfectly hard, is very brittle, and readily reduced to powder; but in very hot weather, it is apt to become somewhat soft and tenacious, and the interior of the pieces is occasionally more or less so even in winter. It is usually imported in casks or boxes.

2. Socotrine Aloes.—The genuine Socotrine aloes is produced in the Island of Socotora, which lies in the Straits of Babelmandel, about forty leagues to the east of Cape Guardafui; but we are told by Ainslie, that the greater part of what is sold under that name is prepared in the kingdom of Melinda, upon the eastern coast of Africa. It is stated by the same author, that the Island of Socotora now belongs to the princes of Hadramaut, a province of Arabia, contiguous to Yemen; and it is probable that the commerce in this variety of aloes is carried on chiefly by the maritime Arabs, who convey it either to India, or up the Red Sea by the same channel through which it reached Europe before the discovery of the southern passage into the Indian Ocean. The species of Aloe which yields it is not certainly known. Ainslie says that it is evidently from the same species with the Cape aloes; but he does not give his reasons for the opinion; and the external character of the drug is so different from that of the Cape, that we cannot but hesitate in admitting their identity of origin. We have been able to discover no good reason for depriving the *A. Soccotrina* of Haworth —the *A. vera* of Miller—of the honour formerly conceded to it, of producing this highly valued variety of aloes. The process for procuring the medicine in Socotora is said to differ somewhat from that followed at the Cape. The juice, expressed from the leaves, is allowed to stand for some time, that the feculent matter may subside; the clear liquor is then poured off into flat dishes and evaporated in the sun. When sufficiently hard, it is introduced into skins and exported. A portion ascends the Red Sea, and through Egypt reaches the ports of Smyrna and Malta, whence it is sent to London. Another portion is carried to Bombay, and thence transmitted to various parts of the world. The little that reaches this country either comes by special order from London, or is brought by our India traders. We have seen a parcel of the drug said to have been received in our market directly from the Island of Socotora.

The Socotrine aloes is in pieces of a yellowish or reddish-brown colour, wholly different from that of the former variety. It is rendered much darker by exposure to the air. Its surface is somewhat glossy, and its fracture smooth and conchoidal, with sharp and semi-transparent edges. The colour of its powder is a bright golden yellow. It has a peculiar, not unpleasant odour, and a taste, which, though bitter and disagreeable, is accompanied with an aromatic flavour. Though hard and pulverulent in cool weather, it is somewhat tenacious in summer, and softens by the heat of the hand.

Much of the aloes sold as the Socotrine, has never seen the island of Socotora, nor even the Indian seas. It has been customary to affix this title as a mark of superior value to those portions of the drug, from whatever source they may have been derived, which have been prepared with unusual care, and are supposed to be of the best quality. Thus, both in Spain and the West Indies, the juice which is obtained without expression, and inspissated in the sun without artificial heat, is called Socotrine aloes; and is probably little inferior to the genuine drug.

The Socotrine aloes has been very long known under this name, and in former times held the same superiority in the estimation of the profession, which it still, to a certain degree, retains.

3. Hepatic Aloes.—This variety is prepared in the West Indies and Spain; and is also brought from the ports of India, particularly from Bombay. According to Ainslie, it is not produced in Hindostan; but taken thither from Yemen in Arabia. It is probably obtained from the same plant or plants which yield the Socotrine; but prepared with less care than this variety, or by a different process. In Spain it is procured from the *Aloe vulgaris*. But the British West Indies are the source of by far the greater part of this variety that is consumed in Europe. In Barbadoes and Jamaica, the aloes plant is largely cultivated in the poorer soils; and in the former island especially, the drug has been so abundantly produced, that the name of Barbadoes aloes has been frequently used as synonymous with hepatic. The species most extensively cultivated in the West Indies, is the *Aloe vulgaris*,* a native of Southeastern Europe, and supposed to be the true aloe of the ancients. The *A. Soccotrina*,† *A. purpurascens*,‡ and *A. arborescens*,§ are also said to be cultivated in these islands. The process for preparing the aloes appears to be somewhat different in different places, or at least as described by different authors. The finest, which is usually called Socotrine, results from the inspissation of the juice placed in bladders or shallow vessels, and exposed to the sun. The common kind is made either by boiling the juice to a proper consistence, or by first forming a decoction of the plant, and then evaporating the decoction. In either case, when the liquor has attained the consistence of honey, it is poured into calabashes and allowed to harden.

Hepatic aloes, like the Socotrine, is of a reddish-brown colour, but is darker and less glossy. It derived its name from the supposed resemblance of its colour to that of the liver. It has none of the aromatic odour of the Socotrine, and is often exceedingly unpleasant. The taste is nauseous, and intensely bitter. The fracture is not so smooth, nor the edges so sharp and transparent as in either of the first mentioned varieties. It softens in the hand, and becomes adhesive. The powder is of a dull olive-yellow colour. Comparatively little of the hepatic aloes is used in this country.

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* De Candolle, Plantes Grasses, fig. 27.

† De Candolle, Plantes Grasses, fig. 85. Curtis's Botanical Magazine, pl. 472.

‡ Curtis's Botanical Magazine, pl. 1474.

§ De Candolle, Plantes Grasses, fig. 38. Curtis's Botanical Magazine, pl. 1306.

The *Caballine, fetid*, or *horse aloes* seldom if ever reaches us. It is a very impure and offensive variety of the drug, procured from the dregs of the juice deposited during the preparation of the more valuable varieties. It is given only to horses; and the best Cape aloes is so cheap, as to render the importation of the caballine, for this purpose, unnecessary. It is almost black, quite opaque, hard, and in consequence of the sand and other impurities which it contains, of a rough fracture.

General Properties. The odour of aloes is different in the different varieties. The taste is in all of them intensely bitter and very tenacious. The colour and other sensible properties have already been sufficiently described. Several distinguished chemists have investigated the nature and composition of aloes. The opinion at one time entertained, that it was a gum-resin, has been abandoned since the experiments of Braconnot, who found it to consist of a bitter principle, soluble in water and in alcohol of 38° B., which he considered peculiar and named *resino-amer;* and of another substance, in much smaller proportion, inodorous and nearly tasteless, very soluble in alcohol, and scarcely soluble in boiling water, which he designated by the name of *flea-coloured principle.* These results have been essentially confirmed by the experiments of Trommsdorff, Bouillon-Lagrange, and Vogel, who consider the former substance as extractive matter, and the latter as having the chief characters of resin. Besides these principles, Trommsdorff discovered in a variety of hepatic aloes, a proportion of insoluble matter which he considered as albumen; and Bouillon-Lagrange and Vogel found that Socotrine aloes yields, by distillation, a small quantity of volatile oil, which they could not obtain from the hepatic. The proportions of the ingredients vary greatly in the different varieties of the drug; and the probability is, that scarcely any two specimens would afford precisely the same results. Braconnot found about 73 per cent. of the *bitter principle* and 26 of the *flea-coloured principle.* Trommsdorff obtained from Socotrine aloes about 75 parts of extractive, and 25 of resin; and from the hepatic 81.25 of extractive, 6.25 of resin, and 12.50 of albumen, in the hundred parts. The former variety, according to Bouillon-Lagrange and Vogel, contains 68 per cent. of extractive and 32 of resin; the latter 52 of extractive, 42 of resin, and 6 of the albuminous matter of Trommsdorff. We are not aware that any analysis has been published of the Cape aloes as a distinct variety.

Berzelius considers the resin of Trommsdorff and others, to belong to that form of matter which he calls *apothême*, (See *Extracts*,) and which is nothing more than extractive, altered by the action of the air. It may be obtained separate, by treating aloes with water, and digesting the undissolved portion with oxide of lead, which unites with the *apothême*, forming an insoluble compound, and leaves a portion of unaltered extractive, which had adhered to it, dissolved in the water. The oxide of lead may be separated by nitric acid very much diluted; and the *apothême* remains in the form of a brown powder, insoluble in cold water, very slightly soluble in boiling water to which it imparts a yellowish-brown colour, soluble in alcohol, ether, and alkaline solutions, and burning like tinder without flame and without being melted. According to the same author, the bitter extractive which constitutes the remainder of the aloes, may be obtained by treating the watery infusion of the drug with oxide of lead, to separate a portion of *apothême* which adheres to it, and evaporating the liquor. Thus procured, it is a yellowish, translucent, gum-like substance, fusible by a gentle heat, of a bitter taste, soluble in ordinary alcohol, but insoluble in that fluid when anhydrous, and in ether. Chlorine produces with its solution a precipitate analogous to *apothême.* Cold sulphuric acid dissolves without changing it. Nitric acid dissolves it, producing a greenish colour. Its solution is rendered brighter by acids, which occasion a slight precipitate, and dark red by the alkalies and the salts of iron. The acetate of lead, tartarized antimony, permuriate of tin, and the salts of manganese, zinc, and copper, do not disturb the solution; the protomuriate of tin, and the nitrates of mercury and silver occasion precipitates.

Aloes yields its active matter to cold water, and when good is almost wholly dissolved by boiling water; but the resinous portion or *apothême* of Berzelius is deposited as the solution cools. It is also soluble in alcohol, rectified or diluted. Long boiling impairs its purgative properties by converting the extractive into insoluble *apothême.* The alkalies, their carbonates, and soap, alter in some measure its chemical nature, and render it of easier solution. It is inflammable, swelling up and decrepitating when it burns, and giving out a thick smoke which has the odour of the drug.

Those substances only are incompatible with aloes, which alter or precipitate the bitter extractive; as the insoluble portion is without action upon the system. Its aqueous solution keeps a long time, even for several months, without exhibiting mouldiness or putrescency; but it becomes ropy, and acquires the character, which it did not previously possess, of affording an abundant precipitate with the infusion of galls.

Medical Properties and Uses. Aloes was known to the ancients. It is mentioned in the works of Dioscorides and Celsus, the former of whom speaks of two kinds. The varieties are similar in their mode of action. They are all cathartic, operating very slowly but certainly, and having a peculiar affinity for the large intestines. Their action, moreover, appears to be directed rather to the muscular coat than to the exhalent vessels; and the discharges which they produce, are therefore seldom very thin or watery. In a full dose they quicken the circulation, and produce general warmth. When frequently repeated, they are apt to irritate the rectum, giving rise, in some instances, to hemorrhoids, and aggravating them when already existing. Aloes has also a decided tendency to the uterine system. Its emmenagogue effect, which is often very considerable, is generally attributed to a sympathetic extension of irritation from the rectum to the uterus; but we can see no reason why the medicine should not act specifically upon this organ; and its influence in promoting menstruation is by no means confined to cases in which its action upon the neighbouring intestine is most conspicuous. A peculiarity in the action of this cathartic is, that an increase of the quantity administered beyond the medium dose, is not attended by a corresponding increase of effect. Its tendency to irritate the rectum may be obviated, in some measure, by combining it with soap or an alkaline carbonate; but it does not follow, as supposed by some, that this modification of its operation is the result of increased solubility; for aloes given in a liquid state produces the same effect as when taken in pill or powder, except that it acts somewhat more speedily. Besides, when externally applied to a blistered surface, it operates exactly in the same manner as when internally administered; thus proving that its peculiarities are not dependent upon the particular form in which it may be given, but on specific tendencies to particular parts.* With its other powers, aloes combines the property of slightly stimulating the stomach. It is therefore, in minute doses, an excellent remedy in habitual costiveness, attended with torpor of the digestive organs. From its special direction to the rectum, it has been found peculiarly useful in the treatment of ascarides. In amenorrhœa it is perhaps more frequently employed than any other remedy, entering into almost all the numerous empirical preparations which are habitually resorted to by females in this complaint, and enjoying a no less favourable reputation in regular practice. It is, moreover, frequently given in combination with more irritating cathartics, in order to regulate their liability to excessive action. Aloes is contra-indicated by the existence of hemorrhoids, and is obviously unsuitable, unless modified by combination, to the treatment of inflammatory diseases.

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* See a paper on Endermic Medication, by Dr. Gerhard, in the North Am. Med. and Surg. Journ. vol. x. p. 155.

The medium dose is 10 grains; but as a laxative it will often operate in the quantity of 2 or 3 grains, and when a decided impression is required, the dose may be augmented to 20 grains. In consequence of its excessively bitter and somewhat nauseous taste, it is most conveniently administered in the shape of pill.*

Off. Prep. Decoctum Aloës Comp., *Lond.*, *Dub.;* Extractum Aloës Hepaticæ, *Dub.;* Ext. Aloës Purificat., *Lond.;* Ext. Colocynth. Comp., *U.S.*, *Lond.*, *Dub.;* Pilulæ Aloës, *U.S.*, *Ed.;* Pil. Aloës Comp., *Lond.*, *Dub.;* Pil. Aloës et Assafœtidæ, *U.S.*, *Ed.;* Pil. Aloës et Myrrhæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Pil. Colocynth. Comp., *Ed.*, *Dub.;* Pil. Gambogiæ Comp., *Ed.*, *Dub.*, *Lond.;* Pil. Rhei Comp., *U.S.*, *Ed.;* Pulvis Aloës Compositus, *Lond.*, *Dub.;* Pulvis Aloës et Canellæ, *U.S.*, *Dub.;* Tinctura Aloës, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Tinct. Aloës Ætherea, *Ed.;* Tinct. Aloës et Myrrhæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Tinct. Benzoini Comp., *U.S.*, *Lond.*, *Ed.*, *Dub.;* Tinct. Rhei et Aloës, *U.S.*, *Ed.;* Vinum Aloës, *U.S.*, *Lond.*, *Ed.*, *Dub.*

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ALTHÆÆ FOLIA et RADIX. *Lond.*

Leaves and Root of Marshmallow.

"Althæa officinalis. *Folia et Radix.*" *Lond.*

Off. Syn. ALTHÆÆ OFFICINALIS RADIX. *Ed.;* ALTHÆA OFFICINALIS. Folia et Radix. *Dub.*

Guimauve, *Fr.;* Eibisch, *Germ.;* Altea, *Ital.;* Altea, Malvavisco, *Span.*

ALTHÆA. *Sex. Syst.* Monadelphia Polyandria.—*Nat. Ord.* Malvaceæ.

Gen. Ch. *Calyx* double, the exterior six or nine-cleft. *Capsules* numerous, one-seeded. *Willd.*

Althæa Officinalis. Willd. *Sp. Plant*, iii. 770.; Woodv. *Med. Bot.* p. 552. t. 198. The marshmallow is an herbaceous perennial, with a perpendicular branching root, and erect woolly stems, from two to four feet or more in height, branched and leafy towards the summit. The leaves are alternate, petiolate, nearly cordate on the lower part of the stem, oblong-ovate and obscurely three-lobed above, somewhat angular, irregularly serrate, pointed, and covered on both sides with a soft down. The flowers are terminal and axillary, with short peduncles, each bearing one, two, or three flowers. The corolla has five spreading, obcordate petals, of a pale purplish colour. The fruit consists of numerous capsules united in a compact circular form, each containing a single seed. The plant grows throughout Europe, inhabiting salt marshes, the banks of rivers, and other moist places. It is found also in this country on the borders of salt marshes. In some parts of the Continent of Europe, it is largely cultivated for medical use. The whole plant abounds in mucilage. Both the leaves and root are officinal, but the latter only is employed to any extent in this country. The flowers are sometimes to be found in the shops, but are scarcely used.

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* Dr. Paris enumerates the following empirical preparations, containing aloes as a leading ingredient:—ANDERSON'S PILLS, consisting of aloes, jalap, and oil of anniseed; HOOPER'S PILLS, of aloes, myrrh, sulphate of iron, canella, and ivory black; DIXON'S ANTIBILIOUS PILLS, of aloes, scammony, rhubarb, and tartarized antimony; SPEEDIMAN'S PILLS, of aloes, myrrh, rhubarb, extract of chamomile, and ess. oil of chamom.; DINNER PILLS, of aloes, mastich, red roses, and syrup of wormwood; FOTHERGILL'S PILLS, of aloes, scammony, colocynth, and oxide of antimony; PETER'S PILLS, of aloes, jalap, scammony, gamboge, and calomel; and RADCLIFF'S ELIXIR, of aloes, cinnamon, zedoary, rhubarb, cochineal, syrup of buckthorn, and spirit and water as the solvent; to which may be added, LEE'S WINDHAM PILLS, consisting of gamboge, aloes, soap, and nitrate of potassa, and LEE'S NEW-LONDON PILLS, of aloes, scammony, gamboge, calomel, jalap, soap, and syrup of buckthorn.

The roots should be collected in autumn from plants at least two years old. They are cylindrical, branched, as thick as the finger or thicker, from a foot to a foot and a half long, externally of a yellowish colour which becomes grayish by drying, within white and fleshy. They are usually prepared for the market by removing the epidermis. Our shops are supplied chiefly if not exclusively from Europe.

Properties. Marshmallow root comes to us in pieces three or four inches or more in length, usually not so thick as the finger, generally round but sometimes split, white externally and downy from the mode in which the epidermis is removed, light and easily broken with a short somewhat fibrous fracture, of a peculiar faint smell, and a mild mucilaginous sweetish taste. Those pieces are to be preferred which are plump and but slightly fibrous. The root contains a large proportion of mucilage besides starch and saccharine matter, and yields its virtues readily to boiling water. A principle was discovered in it by M. Bacon, which he supposed to be peculiar to the Marshmallow, but which has been ascertained to be identical with the *asparagin* of Robiquet. MM. Boutron-Charlard and Pelouze have found it to belong to that class of organic principles, which are convertible by the agency of strong acids, of potassa or soda, or even of water alone at a high temperature, into ammonia and peculiar acids, and which are designated by the termination *amide.* Thus asparagin, which must now be called *asparamide,* is converted into ammonia and *asparmic,* or, as it was formerly named, *aspartic acid;* and one atom of the resulting asparmate of ammonia is equivalent to one atom of asparamide, and one of water. A solution of asparamide undergoes this change, in some degree, even at common temperatures; but the alteration is greatly promoted by the agency of heat, or of the alkalies. Acids, also, produce the same effect, but they unite with the ammonia and liberate the asparmic acid. Asparamide may be obtained by macerating the bruised marshmallow root in four times its weight of cold water for two days, decanting, repeating the maceration with a fresh portion of water, uniting the infusions thus prepared, evaporating to one-half, filtering, again evaporating to the consistence of syrup, and allowing the liquor to stand. In four or five days crystals of asparamide are deposited. This principle is crystallizable, inodorous, of a very feeble taste, soluble in 58 parts of cold water, and in much less boiling water, more soluble in diluted alcohol than in water, but insoluble in anhydrous alcohol and ether. It is found in various other plants besides the marshmallow, as in the shoots of asparagus, in all the varieties of the potato, and in the roots of the comfrey and liquorice plant. (*Journ. de Pharm.* xix. 208.) Marshmallow root is said to become somewhat acid by decoction.

Those pieces should be rejected which are woody, discoloured, mouldy, of a sour or musty smell, or a sourish taste.

The roots of other *Malvaceæ* are sometimes substituted without disadvantage, as they possess similar properties;—such are those of the *Althæa rosea* or *hollyhock*, and the *Malva Alcea.*

Medical Properties and Uses. The virtues of the marshmallow are exclusively those of a demulcent. The decoction of the root is much used in Europe in irritation and inflammation of the mucous membranes. The roots themselves, boiled and bruised, are sometimes employed as a poultice. The leaves are applied to similar uses. In France, the powdered root is much used in the preparation of pills and electuaries.

Off. Prep. Decoctum Althææ, *Dub., Ed.;* Syrupus Althææ, *Lond., Ed., Dub.* W.

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ALUMEN. *U.S., Lond., Ed., Dub.*

Alum.

Alun, *Fr., Dan., Swed.;* Alaun, *Germ.;* Allume, *Ital.;* Alumbre, *Span.*

The officinal alum is a double salt, consisting of the sulphate of alumina, united to the sulphate of potassa. It is included in the Materia Medica of the United States and British Pharmacopœias, as an article to be procured from the wholesale manufacturer.

Alum is manufactured occasionally from earths which contain it ready formed, but most generally from minerals which, embracing most or all of its constituents, are hence called alum ores. The principal alum ores are the alum stone, a native mixture of subsulphate of alumina and sulphate of potassa, which is found in large quantities at Tolfa and Piombino in Italy, and certain natural mixtures of sulphuret of iron with schist or clay.

It is particularly at the Solfaterra and other places in the kingdom of Naples, that alum is extracted from earths which contain it ready formed. The ground being of volcanic origin, and having a temperature of about 104°, an efflorescence of pure alum is formed upon its surface. This is collected and lixiviated, and the solution made to crystallize by slow evaporation in leaden vessels sunk in the ground.

The alum stone is manufactured into alum by calcination, and subsequent exposure to the air for three months, the mineral being frequently sprinkled with water, in order that it may be brought to the state of a soft mass. This is lixiviated, and the solution obtained crystallized by evaporation. The alum stone may be considered as consisting of alum united with a certain quantity of the hydrate of alumina. This latter, by the calcination, loses its water, and becomes incapable of remaining united with the alum of the mineral, which is consequently set free. Alum of the greatest purity is obtained from this ore.

Native mixtures of sulphuret of iron and schist, when compact, are treated by exposure to the air for a month. The mineral is then stratified with wood, which is set on fire. The combustion which ensues is slow and protracted; the sulphur is in part converted into sulphuric acid, which unites with the alumina; and the sulphate of alumina thus formed generates a portion of alum with the potassa derived from the ashes of the wood. The iron, in the mean time, is almost wholly converted into peroxide, and thus becomes insoluble. The matter is lixiviated, and the solution crystallized into alum by evaporation. The mother-waters, containing sulphate of alumina, are then drawn off and made to yield a fresh portion of alum by the addition of sulphate of potassa. This process is practised at Liege in France.

When the alum ore consists principally of sulphuret of iron and clay, sulphate of iron or green vitriol is obtained at the same time. The ore is placed in heaps, and occasionally sprinkled with water. The sulphuret of iron gradually absorbs oxygen and passes into the state of sulphate, which effloresces on the surface of the heap. Part of the sulphuric acid formed unites with the alumina; so that after the chemical changes are completed, the heap contains both the sulphate of iron and the sulphate of alumina. At the end of about a year, the matter is lixiviated, and the solution of the two sulphates obtained is concentrated to the proper degree in leaden boilers. The sulphate of iron crystallizes, while the sulphate of alumina, being a deliquescent salt, remains in the mother-waters. These are drawn off, and treated with a certain quantity of the sulphate of potassa in powder, heat being at the same time applied. They are then allowed to cool, that the alum may crystallize. The crystals are then separated from the solution, and purified by a second solution and crystallization. They are next added to boiling water to full saturation, and the solution is transferred to a cask, where, on cooling, nearly the whole concretes into a crystalline mass. The cask is then taken to pieces, and the salt having been broken up, is packed in barrels for the purposes of commerce. This process is most generally followed for manufacturing alum, being employed in France, Great Britain, and the United States.

Alum is manufactured also by the direct combination of its constituents. With this view, clays are selected as free from iron and carbonate of lime as possible, and calcined to peroxidize the iron and render them more easily pulverizable; after which they are dissolved, by the assistance of heat, in weak sulphuric acid. The sulphate of alumina thus generated, is next crystallized into alum by the addition of sulphate of potassa in the usual manner.

Alum has not been an article of import into the United States to any extent since 1818, or a year or two earlier; the demand since then having been almost entirely supplied by the domestic manufacture. The aggregate quantity made may be estimated at from a thousand to twelve hundred tons. The method usually employed in the United States, consists in the direct combination of sulphuric acid with clay. Tyson & Ellicott, however, manufacturing chemists of Baltimore, employ for making alum the ore found at Cape Sable, on the Magothy river, Maryland. This ore, which was extensively worked during the late war under the superintendence of Dr. Troost, consists of lignite, clay, sulphuret of iron, and sand. It exists in beds of from six to ten feet in thickness, covered by a stratum of sand. It is dug up, and thrown into heaps of from one to three thousand tons, is set on fire, and continues to burn for several years. The ashes are transported to the manufactory, where they are lixiviated, and the solution obtained evaporated in leaden vessels. When the solution indicates about 25° of Baumé's hydrometer, sulphate of potassa is added, after which it is drawn off to crystallize. At the end of about a week, the crystallization having been completed, the mother-waters are pumped off; and the crystals, after being washed and well drained, are dissolved in leaden boilers. From these the solution is transferred to the refining vessels, and left for about three weeks to crystallize. At the end of that time, the mother-waters are drawn off from the crystals, and these are broken up, dried, and packed in barrels.

Besides the officinal alum, the mode of manufacturing which is above described, there are several varieties of this salt, in which the potassa is replaced by other bases, as for example, ammonia and soda. *Ammoniacal alum*, or the sulphate of alumina and ammonia, is sometimes manufactured in France, where it is formed by adding putrid urine to a solution of the sulphate of alumina. It resembles so exactly the potassa alum, that it is impossible by simple inspection to distinguish them; and in composition, it is perfectly analogous to the ordinary alum. It may, however, be distinguished by subjecting it to a strong calcination, after which alumina will be found as the sole residue; or by rubbing it up with potassa or lime and a little water, when the smell of ammonia will be perceived.

Properties. Alum is a white, slightly efflorescent salt, crystallized in regular octohedrons, and possessing a sweetish, astringent taste. It dissolves in between fourteen and fifteen times its weight of cold, and three-fourths of its weight of boiling water. Its sp. gr. is 1.71. It reddens litmus, but changes the blue tinctures of the petals of plants, green. It cannot therefore be properly said to contain an excess of acid. When heated a little above the boiling point, it undergoes the aqueous fusion; and if the heat be continued, it loses its water, swells up, becomes white and opaque, and is converted into the officinal preparation called *dried alum.* (See *Alumen Exsiccatum.*) Exposed to a red heat, it gives off oxygen, together with sulphurous and anhydrous sulphuric acids; and the residue consists of alumina and sulphate of potassa. When calcined with finely divided charcoal, it gives rise to a peculiar spontaneously inflammable substance, called *pyrophorus*, which consists of a mixture of sulphuret of potassium, alumina, and charcoal.

Several varieties of alum are known in commerce. *Roche* alum, so called from its having come originally from Roccha in Syria, is a purer sort of alum, which occurs in fragments about the size of an almond, and covered with an efflorescence of a pale rose colour. A similar description is given by Thenard of the *Roman* alum, which he states to be in small fragments, having a rose coloured surface, arising from a slight covering of oxide of iron.

All the alums of commerce contain more or less sulphate of iron, varying from five to seven parts in the thousand. Roman alum is among the purest varieties, and is, therefore, much esteemed The iron is readily detected by adding to a solution of the suspected alum a few drops of the ferrocyanate of potassa, which will cause a greenish-blue tint, if iron be present. The quantity of iron usually present, though small, is injurious to the alum when used in dyeing. It may, however, be purified by dissolving it in the smallest quantity of boiling water, and stirring the solution as it cools; or by repeated solutions and crystallizations.

Incompatibles. Alum is incompatible with the alkalies and their carbonates, lime and lime-water, magnesia and its carbonate, tartrate of potassa, and acetate of lead.

Composition. Alum was for a long time regarded as a sulphate of alumina. It is to Descroizilles, Vauquelin, and Chaptal, that we owe the discovery that it also contains sulphate of potassa, sulphate of ammonia, or both these salts. When its second base is potassa, it consists of one equivalent of tersulphate of alumina 171.7, one equiv. of sulphate of potassa 87.25, and twenty-four equiv. of water 216 = 474.95. In the ammoniacal alum, the equiv. of sulphate of potassa is replaced by one of sulphate of ammonia. In other respects its composition is the same. *Alumina* is classed by the chemist as an earth, and is essential to the constitution of alum, as it cannot be replaced by any other base. It may be obtained by precipitating a solution of alum by water of ammonia, added in excess. As thus obtained, it presents a gelatinous form, and is in the state of hydrate. In this form, it has been used by some practitioners on the continent of

Europe in diarrhœa. It consists of two equiv. of a metallic radical called *aluminium* 27.4, and three equiv. of oxygen 24=51.4. It is, therefore, a sesquioxide.

Medical Properties, &c. Alum is a powerful astringent, and as such is used both internally and externally in restraining hemorrhages. It has been recommended in free doses by Dr. Scudamore, in the form of saturated solution, in hæmoptysis and hæmatemesis. It is employed locally in the form of astringent and repellent injections and collyria. The dose in hemorrhages is from five to twenty grains, repeated every hour or two, until the bleeding abates. In less urgent cases, smaller doses are advisable; as large ones are apt to nauseate, an effect which may often be obviated by the addition of some aromatic. Dr. Percival extolled its use as a remedy in colica pictonum, in which disease it may be supposed to act on chemical principles, by converting the poisonous carbonate of lead into the inert sulphate. It may be given in these cases in doses of fifteen grains, repeated every third, fourth, or fifth hour.

In various anginose affections, it is found highly useful, topically applied either in powder or solution. When the affection is attended with membranous exudation, its efficacy has been particularly insisted on by Bretonneau, applied in solution prepared with vinegar and honey for adults, and in powder, by *insufflation*, in the cases of children. When used in the latter way, a drachm of finely powdered alum may be placed in one end of a tube, and then blown by means of the breath into the throat of the child. M. Velpeau, in 1835, extended the observations of M. Bretonneau, and has successfully applied alum, not only in simple inflammatory sore-throat, but in those forms of angina dependent on small-pox, scarlatina, &c. In these cases the powdered alum may be applied several times a day to the fauces by means of the index finger, so as to cover the affected surfaces. In the interval, the patient should gargle the throat with a solution of from two to four scruples of alum in four fluidounces of barley-water sweetened with honey. (*N. Amer. Archives of Med. and Surg. Sci.*, ii. 281.)

Alum is sometimes exhibited in the form of *alum whey*, made by boiling two drachms of alum in a pint of milk, and straining the decoction, of which two fluidrachms are a dose. Briskly agitated with the white of eggs, it forms a coagulum which is used as an external application in some forms of ophthalmia. (See *Cataplasma Aluminis.*)

Off. Prep. Alumen Exsiccatum, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Cataplasma Aluminis, *Dub.;* Liquor Aluminis Compositus, *Lond.;* Pulvis Aluminis Compositus, *Ed.* B.

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AMMONIACUM. *U.S.*, *Lond.*, *Ed.*

Ammoniac.

"Heracleum gummiferum. Succus concretus. *The concrete juice.*" *U.S.*

Off. Syn. AMMONIACUM GUMMI. HERACLEUM GUMMIFERUM. Gummi Resina. *Dub.*

Gomme Ammoniaque, *Fr.;* Ammoniak, *Germ.;* Gomma Ammoniaco, *Ital.;* Goma Amoniaco, *Span.;* Ushek, *Arab.;* Semugh belshereen, *Persian.*

Much uncertainty has existed among botanists as to the plant which yields ammoniac. It was generally believed to be a species of *Ferula*, till Willdenow raised from some seeds mixed with the gum-resin found in the shops, a plant which he ascertained to be an *Heracleum*, and named *H. gummiferum*, under the impression that it must be the true source of the medicine. On this authority, the plant has been adopted by the British Colleges, and is recognised in our national Pharmacopœia. Willdenow expressly acknowledges that he could not procure from it any gum-resin, but ascribes the result to the influence of the climate. The *Heracleum*, however, does not correspond exactly with the representations given of the ammoniac plant by travellers; and Sprengel has ascertained that it is a native of the Pyrenees, and never produces gum. By this botanist it is named *H. Pyrenaicum*, though before described by Lapeyrouse under the title of *H. amplifolium*. (*Merat and De Lens.*) Mr. Jackson, in his account of Morocco, imperfectly describes a plant indigenous in that country, supposed to be a species of *Ferula*, from which gum-ammoniac is procured by the natives: but it may be doubted whether its product is the true ammoniac of the shops, which is derived exclusively from Persia. M. Fontaniér, who was sent by the French Government into the Levant, and resided many years in Persia, saw the ammoniac plant growing in the province of Fars, and transmitted a drawing of it with specimens to Paris. From these it was inferred to be a species of Ferula; and Merat and De Lens propose for it the name originally applied to it by Lemery, of *F. ammonifera*. It would appear, however, from recent accounts, that specimens of the plant obtained in Persia by Colonel Wright, and examined by Mr. David Don, prove it to belong to a genus allied to Ferula, but essentially different; and named by Mr. Don, *Dorema*. A description of it is contained in the 16th volume of the Linnean Transactions, under the name of *D. Ammoniacum*.

The ammoniac plant grows spontaneously in Farsistan, Irauk, and other Persian provinces; in the southern districts of Arabia; and perhaps in the North of Africa. It attains the height of six or seven feet, and in the spring and early part of summer abounds in a milky juice, which flows out upon the slightest puncture. From the accounts of travellers it appears, that in the month of May, the plant is pierced in innumerable places by an insect of the beetle kind. The juice, exuding through the punctures, concretes upon the stem, and when quite dry is collected by the natives. M. Fontaniér states that the juice exudes spontaneously, and that the harvest is about the middle of June. The gum-resin is sent to Bushire, whence it is transmitted to India. It reaches this country usually by the route of Calcutta. The name *gum ammoniac* is thought to have been derived from the temple of Jupiter Ammon in the Lybian desert, where the drug is said to have been formerly collected.

Properties. Ammoniac comes either in the state of separate tears, or in aggregate masses, and in both forms is frequently mixed with impurities. That of the tears, however, is preferable, as the purest may be conveniently picked out, and kept for use. These are of an irregular shape, usually more or less globular, opaque, yellowish on the outside, whitish within, compact, homogeneous, brittle when cold, and breaking with a conchoidal shining fracture. The masses are of a darker colour and less uniform structure, appearing, when broken, as if composed of numerous white or whitish tears, embedded in a dirty gray or brownish substance, and frequently mingled with foreign matters, such as seeds, fragments of vegetables, and sand, or other earth.

The smell of ammoniac is peculiar, and stronger in the mass than in the tears. The taste is slightly sweetish, bitter, and somewhat acrid. The sp. gr. is 1.207. When heated, the gum-resin softens and becomes adhesive, but does not melt. It burns with a white flame, swelling up, and emitting a smoke of a strong, resinous, slightly alliaceous odour. It is partly soluble in water, alcohol, ether, vinegar, and alkaline solutions. Triturated with water, it forms an opaque milky emulsion, which becomes clear upon standing. The alcoholic solution is transparent, but is rendered milky by the addition of water. Bucholz obtained from 100 parts of ammoniac, 22.4 parts of gum, 72.0 of resin, 1.6 of bassorin, and 4.0 of water including volatile oil and loss. Braconnot obtained 18.4 per cent. of gum, 70.0 of resin, 4.4 of a gluten-like substance (bassorin,) and 6.0 of water, with 1.2 per cent. of loss. Hagen succeeded in procuring the volatile oil in a separate state by repeated distillation with water. It has a penetrating disagreeable odour, and a taste at first mild, but afterwards bitter and nauseous. The resin of ammoniac is dissolved by alcohol and the fixed and volatile oils, but is divided by ether into two resins, of which one is soluble, the other insoluble in that menstruum.

Medical Properties and Uses. This gum-resin is stimulant and expectorant, in large doses cathartic, and, like many other stimulants, may be so given as occasionally to prove diaphoretic, diuretic, or emmenagogue. It has been employed in medicine from the highest antiquity, being mentioned in the writings of Hippocrates. The complaints in which it is most frequently used, are chronic catarrh, asthma, and other pectoral affections, attended with deficient expectoration without acute inflammation, or with too copious secretion from the bronchial mucous membrane dependent upon debility of the vessels. It is thought to have been useful in some cases of amenorrhœa, and in those chlorotic and hysterical conditions of the system arising out of this complaint. It has also been prescribed in obstructions or chronic engorgements of the abdominal viscera, under the vague notion of its deobstruent power. Any good which it may do in these affections, is more probably ascribable to its revulsive action upon the alimentary mucous membrane. Authors speak of its utility in long and obstinate colics dependent on mucous matter lodged in the intestines; but it would be difficult to ascertain in what cases such mucous matter existed, and, even allowing its presence, to decide whether it was a cause or a result of the diseased action. Ammoniac is usually administered in combination with other expectorants, with tonics, or emmenagogues. It is much less used than formerly. Externally applied in the shape of a plaster, it is thought to be useful as a discutient or resolvent in white swellings of the joints and other indolent tumours. (See *Emplastrum Ammoniaci.*)

It is given in substance, in the shape of pill or emulsion. The latter form is preferable. (See *Mistura Ammoniaci.*) The dose is from ten to thirty grains.

Off. Prep. Emplastrum Ammoniaci, *U.S*,, *Lond.*, *Ed*,, *Dub.;* Emplastrum Ammoniaci cum Hydrargyro, *Lond.*, *Dub.;* Emplastrum Gummosum, *Ed.;* Mistura Ammoniaci, *U.S.*, *Lond.*, *Dub.;* Pilulæ Scillæ Compositæ, *Lond.*, *Ed.*, *Dub.* W.

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AMMONIÆ MURIAS. *U.S.*, *Lond.*, *Dub.*

Muriate of Ammonia.

Off. Syn. MURIAS AMMONIÆ. *Ed.*

Sal ammoniac, Hydrochlorate of ammonia; Sel ammoniac, *Fr.;* Salmiak, *Germ.:* Sale ammoniaco, *Ital.;* Sal ammoniaco, *Span.*

This salt is placed in the Materia Medica list of all the Pharmacopœias noticed in this work, as a substance to be obtained from the wholesale manufacturer. It originally came from Egypt, where it was obtained by sublimation from the soot of camels' dung, which is used in that country for fuel. Since the year 1790, it has been manufactured in Europe by chemical processes, and the importation from Egypt has gradually ceased. The first European sal ammoniac manufactories were established in England and Scotland. Soon after these, one was set up in Paris by Baumé, and shortly afterwards another in Brunswick in Germany.

Preparation. The French method of preparing muriate of ammonia is as follows. Bones and old woollen rags are distilled in cast iron cylinders, placed over furnaces. At one end of the cylinder, which is made to open and shut, the substances are introduced, and from the other, by means of a tube communicating with a series of casks connected together by other tubes, the products are disengaged. A tube from the last cask carries the incondensible products either outside the manufactory, or into the furnace to be destroyed by combustion. In case of the latter arrangement, partitions of wire-gauze must be placed at intervals within the tube, to prevent explosions. The products consist of water, oil, a small quantity of acetate and hydrocyanate of ammonia, and a large quantity of carbonate of ammonia. After being withdrawn from the casks, they are mixed with powdered sulphate of lime, or made to filter through a layer of this salt. By double decomposition, sulphate of ammonia and carbonate of lime are generated, the former of which remains in solution, while the latter is precipitated. Chloride of sodium (common salt) is now added in excess to the solution of the sulphate; and by a new play of affinities, implying the decomposition of water, muriate of ammonia and sulphate of soda are formed. The solution of the mixed salts is then concentrated, and by successive evaporations and coolings, they are made to crystallize separately. The muriate of ammonia is then dried, and finally sublimed. The drying is performed by exposing the crystallized salt to heat in a kind of oven, whereby it becomes changed into a spongy friable ash-coloured mass. This is put, while hot, into glazed earthen jars, furnished with a perforated cover, where it is sublimed by means of a sand-bath, at a heat of 320°.

The process pursued in England is in principle the same as that adopted by the French. In London, however, much use is made of the ammoniacal liquor, generated in coal-gas works, to obtain the sulphate of ammonia for sublimation with the common salt.

Besides the method just described, there are several others for obtaining sulphate of ammonia, for the purpose of being converted into muriate of ammonia. Sometimes bones are heated to redness directly with sulphate of lime or gypsum. In this case there are formed sulphate of ammonia and carbonate of lime, the former of which is separated by lixiviation. In Scotland, the sulphate of ammonia is procured by lixiviating the soot of sulphureous coal.

It has been proposed to obtain muriate of ammonia by heating a mixture of the bittern of sea-salt works with animal matters. The bittern consists principally of muriate of magnesia, and the animal matters furnish impure carbonate of ammonia; and these salts, by double decomposition, generate muriate of ammonia and carbonate of magnesia. Other processes have been proposed or practised, for an account of which the reader is referred to the Chemical Essays of Mr. Parkes, who has appropriated a separate essay to this subject.

Commercial History. All the muriate of ammonia consumed in the United States, is obtained from abroad. Its commercial varieties are known under the names of the *crude* and *refined.* The crude is imported from Calcutta in chests, containing from 350 to 400 pounds. This variety is consumed almost entirely by coppersmiths and other artisans in brass and copper, being employed for the purpose of keeping the metallic surfaces bright preparatory to brazing. The refined comes to us exclusively from England, packed in casks containing from 5 to 10 cwt.

Properties. Muriate of ammonia is a white salt, occurring either in circular concavo-convex cakes of about two inches in thickness, or crystallized in conical masses. It has a sharp saline taste, but no smell. Its sp. gr. is 1.45. It dissolves in three times its weight of cold, and about its own weight of boiling water; and during its solution, considerable cold is produced. A hot concentrated solution, when it cools, deposites the salt in feathery crystals. These when exposed to heat, first undergo the watery fusion, then dry, and finally, below a red heat, sublime in the form of white vapours. The muriate of ammonia possesses the property of combining with the corrosive chloride of mercury and increasing its solubility. It is decomposed by the strong mineral acids, and by the alkalies and alkaline earths, the former disengaging muriatic acid, and the latter ammonia. It is a permanent salt in the ordinary states of the atmosphere, but sometimes the conical crystallized variety is deliquescent, owing to the presence of a portion of muriate of lime. Hence the sublimed salt is always to be preferred in medicine. It is incompatible with acetate of lead and nitrate of silver, producing with these salts a precipitate of chloride either of lead or silver.

Composition. Muriate of ammonia is composed of one equivalent of muriatic acid 36.42, and one equiv. of ammonia 17.15 = 53.57; or in ultimate constituents, of one equiv. of chlorine, one equiv. of nitrogen, and four equiv. of hydrogen. In equivalent volumes, it consists of two volumes of muriatic acid, and two volumes of ammonia, condensed into a solid.

Medical Properties. Muriate of ammonia is employed both internally and externally. Internally it acts primarily on the alimentary canal as a peculiar irritative stimulus; but secondarily as an excitant and alterative of the capillary, glandular, and lymphatic system, as also of the mucous, serous and fibrous membranes, the secretions of which it is supposed to improve. It has accordingly been deemed useful in catarrhal and rheumatic fevers, pneumonia, bronchitis, pulmonary catarrh, and other mucous and serous inflammations, after their first violence has abated. Several cases of pectoral disease, simulating incipient phthisis, are reported to have been cured by this remedy in Otto's Bibliothek, for 1834. (*N. Amer. Archives*, i. 299, *Jan.* 1835.) It has also been found useful in visceral obstructions of various kinds. The dose is from five to thirty grains, repeated every two or three hours, given in powder mixed with powdered gum or sugar, or dissolved in syrup or mucilage. It is very little used as an internal remedy in the United States; but on the continent of Europe, especially in Germany, it is a good deal employed. Considering the potent nature of its constituents, and the various testimony borne in favour of its powers, its employment has perhaps been too much neglected.

Externally applied, it operates in two ways,—by the cold produced during its solution, and by the stimulus created by the salt itself. It acts in the former way when it proves beneficial in the form of lotions, applied to the head in mania, apoplexy, and violent headachs; and on the latter principle, in the cure of indolent tumours, contusions, gangrene, psora, ophthalmia, chilblains, &c. For external use, it may be dissolved to the extent of an ounce in nine fluidounces of water, a fluidounce of alcohol being added to the solution.

Muriate of ammonia is used in the preparation of several officinal compounds, but does not enter into the composition of any of them except the *Ferrum Ammoniatum*, and *Hydrargyrum Ammoniatum*. B.

AMYGDALA. *U.S.*

Almonds.

"Amygdalus communis. Nuclei. *The kernels.*" *U.S.*

Off. Syn. AMYGDALÆ AMARÆ, AMYGDALÆ DULCES. Amygdalus communis. Nuclei. *Lond.*, *Dub.*; AMYGDALI COMMUNIS NUCLEI. Amygdalæ dulces, ex varietate sativa. *Ed.*

Amande douce, Amande amère, *Fr.*; Süsse Mandeln, bittere Mandeln, *Germ.*; Mandorle dolci, Mandorle amare, *Ital.*; Almendra dulce, Almendra amarga, *Span.*

Amygdalus. *Sex. Syst.* Icosandria Monogynia.—*Nat. Ord.* Amygdaleæ.

Gen. Ch. *Calyx* five-cleft, inferior. *Petals* five. *Drupe* with a nut perforated with pores. *Willd.*

Amygdalus communis. Willd. *Sp. Plant.* ii. 982; Woodv. *Med. Bot.* p. 507. t. 183. The almond tree rises usually from fifteen to twenty feet in height, and divides into numerous spreading branches. The leaves stand upon short footstalks, are about three inches long, and three quarters of an inch broad, elliptical, pointed at both ends, veined, minutely serrated, with the lower serratures and petioles glandular, and are of a bright green colour. The flowers are large, of a pale red colour varying to white, with very short peduncles and petals longer than the calyx, and are usually placed in numerous pairs upon the branches. The fruit is of the peach kind, with the outer covering thin, tough, dry, and marked with a longitudinal furrow, where it opens when fully ripe. Within this covering is a rough shell, which contains the kernel or almond.

There are several varieties of this species of Amygdalus, differing chiefly in the size and shape of the fruit, the thickness of the shell, and the taste of the kernel. The last is the most important point of difference, and has given rise to the botanical division of the species into—1. *Amygdalus* (*communis*) *dulcis*, and 2. *Amygdalus* (*communis*) *amara*, the former bearing sweet, the latter bitter almonds. It is the fruit of the first only which is considered officinal in the Pharmacopœia of the United States.

The almond tree is a native of Persia, Syria, and Barbary; and is very extensively cultivated in various parts of the South of Europe. It has been introduced into the United States; but in the northern and middle sections the fruit does not usually come to perfection. We are supplied with sweet almonds chiefly from Spain and the South of France. They are distinguished into the soft-shelled and hard-shelled, the former of which come from Marseilles and Bordeaux, the latter from Malaga. From the latter port they are sometimes brought to us without the shell. Dr. A. T. Thomson states, that the *Jordan* almonds, which are taken from Malaga to England, and are the best imported into that country, are said to be the produce of a distinct species of Amygdalus. According to the same author, the bitter almonds are obtained from Morocco.

Properties. The shape and appearance of almonds are too well known to require description. Each kernel consists of two white cotyledons, enclosed in a thin, yellowish-brown, bitter skin, which is easily separable after immersion in boiling water. When deprived of this covering, they are called *blanched almonds.* The two varieties of sweet and bitter almonds deserve each a separate notice, as they are both considered officinal in several of the Pharmacopœias of Europe, and both are occasionally employed in medicine.

1. Amygdalæ Dulces. *Sweet Almonds.* These when blanched are without smell, and have a sweet, very pleasant taste, which has rendered them a favourite article of diet in almost all countries where they are readily attainable. They are, however, generally considered of difficult digestion. By the analysis of M. Boullay, it appears that they contain in 100 parts, 5 parts of pellicle, 54 of fixed oil, 24 of albumen, 6 of uncrystallizable sugar, 3 of gum, 4 of fibrous matter, 3.5 of water, and 0.5 of acetic acid comprising loss. The fixed oil, which may be obtained by expression, is colourless or slightly tinged with yellow, sweet and bland to the taste, and may be substituted for olive oil in most of the economical uses to which the latter is applied. (See *Oleum Amygdalæ.*) Almonds when rubbed with water form a milky emulsion, the insoluble matters being suspended by the agency of the mucilaginous and saccharine principles.

2. Amygdalæ Amaræ. *Bitter Almonds.* These are smaller than the preceding variety. They have the bitter taste of the peach-kernel, and, though in their natural state inodorous or nearly so, have, when triturated with water, the fragrance of the peach blossom. They have generally been supposed to contain, in addition to the principles found in the other variety, a portion of hydrocyanic acid, and an essential oil, to which their peculiar taste and smell, and their peculiar operation upon the system, have been ascribed. The bitter almonds yield their fixed oil by pressure; and the essential oil, impregnated with hydrocyanic acid, may be obtained from the residue by distillation with water. This oil, usually called *oil of bitter almonds,* has a bitter, acrid, burning taste, and the peculiar odour of the kernel in a very high degree. It is of a yellowish colour, heavier than water, soluble in alcohol and ether, slightly soluble in water, and deposites, upon standing, a white crystalline substance, which consists chiefly of benzoic acid. It may be entirely freed from hydrocyanic acid by agitating it strongly with hydrate of lime and a solution of muriate of iron, and submitting the mixture to distillation. The oil comes over with the water, from which it may be separated in the usual manner. Thus purified, it still retains its peculiar odour, with a burning and aromatic taste; but, as proved by Dr. Göppert of Breslau, is wholly destitute of those poisonous properties which distinguish the oil in its original state, and which depend on the presence of hydrocyanic acid. The odour of the oil of bitter almonds has been usually, but erroneously, ascribed to this acid, which, on examination, will be found to smell very differently. The same remark is applicable to the essential oils of the cherry laurel, of the bird cherry, and probably of other vegetables supposed to contain hydrocyanic acid. The benzoic acid which the oil of bitter almonds deposites upon standing, has been satisfactorily proved by Robiquet and Boutron not to pre-exist in the oil, but to result from the absorption of oxygen. It appears also, from their experiments, that the oil itself does not exist already formed in the bitter almond, and that water is essential to its production. The principle from which it is probably formed, and upon which the peculiar sensible, and perhaps medicinal properties of the bitter almond depend, is a crystallizable, azotized substance, white, inodorous, of a sweetish bitter taste, unalterable in the air, soluble in alcohol, exhaling an agreeable odour when heated alone, and an odour of ammonia when heated

with a solution of caustic potassa. MM. Robiquet and Boutron, by whom it was discovered, have conferred on it the name of *amygdalin*. (*Journ. de Chim. Méd.* vi. 380 and 750.)

The essential oil of bitter almonds operates upon the system in a manner closely analogous to that of hydrocyanic acid. A single drop is sufficient to destroy a bird, and four drops have occasioned the death of a dog of the middle size. The distilled water of bitter almonds operates in a similar manner, though less powerfully; and the almonds themselves have proved deleterious when taken in considerable quantities. Confectioners employ bitter almonds for communicating flavour to the syrup of orgeat. The kernel of the peach possesses similar properties, and is frequently used as a substitute. The oil of bitter almonds is much used by the perfumers.

Medical Properties and Uses. Sweet almonds exercise no other influence upon the system than that of a demulcent. The emulsion formed by triturating them with water is a pleasant vehicle for the administration of other medicines, and is itself useful in cases of catarrhal affection. Bitter almonds are more energetic, and, though not much in use, might undoubtedly be employed with advantage in cases to which the hydrocyanic acid is applicable. An emulsion made with them has been beneficially prescribed in pectoral affections attended with cough, and is said to have cured intermittents when bark has failed. (*Bergius, Mat. Med.*) It probably operates by diminishing the excitability of the nervous system, and moderating existing irritation. Dr. A. T. Thomson says that he has found it extremely useful as a lotion in acne rosea and in impetigo. Bitter almonds are said by Hufeland to have been successfully employed for the expulsion of the tape worm. In some persons they produce urticaria when taken in the smallest quantities.

The *oil of bitter almonds* might probably be substituted with advantage for the medicinal hydrocyanic acid, as the acid contained in the oil is much less liable to decomposition, remaining for several years unaltered, if the oil is preserved in well stopped bottles. According to Schrader, 100 parts of the oil contain sufficient acid for the production of 22.5 parts of Prussian blue. From this fact it may be inferred, that the oil is about four times as strong as our officinal hydrocyanic acid, and may therefore be given in the dose of a quarter of a drop to be gradually and very cautiously increased till some effect upon the system is observed. It may be administered in emulsion with gum Arabic, loaf sugar, and water.

Off. Prep. Confectio Amygdalæ, *U.S.*, *Lond.*, *Dub.*; Emulsio Acaciæ Arabicæ, *Ed.*, *Dub.*; Emulsio Amygdali Communis, *Ed.*; Mistura Amygdalæ, *U.S.*, *Lond.*, *Dub.*; Oleum Amygdalarum, *Lond.*, *Ed.*, *Dub.* W.

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AMYGDALUS PERSICA. Folia. *Dub.*

Peach Leaves.

Pecher, *Fr.*; Pfirsichbaum, *Germ*; Persico, *Ital.*; Alberchigo, *Span.*

Amygdalus. See AMYGDALA.

Amygdalus Persica. Willd. *Sp. Plant.* ii. 982; Woodv. *Med. Bot.* p. 511. t. 184.—*Persica Vulgaris.* Miller, Lamarck. Every one is familiar with the appearance of the common peach tree. It is characterized specifically by having "all the serratures of the leaves acute, and by its sessile solitary flowers." Though its native country is not certainly known, it is generally supposed to have been brought originally from Persia. In no country, perhaps, does it attain greater perfection, as regards the character of its fruit, than in the United States.

Peaches are among the most grateful and wholesome of our summer fruits. They abound in saccharine matter, which renders their juice susceptible of the vinous fermentation; and a distilled liquor prepared from them is much used in some parts of the country under the name of peach brandy.

The kernels of the fruit bear a close resemblance in appearance and properties, and probably in chemical nature, to the bitter almonds, for which they are frequently, and without inconvenience, substituted in our shops. They are employed by distillers in the preparation of *liqueurs*, and by cake-bakers to give flavour to various productions of their ovens.

The flowers and leaves also have the peculiar odour and taste of the bitter almonds, and probably contain hydrocyanic acid. The leaves afford a volatile oil by distillation. These are the only part directed by the Dublin College.

Medical Properties, &c. Peach leaves are said to be laxative; and they probably exert, to a moderate extent, a sedative influence over the nervous system. They have been used as an anthelmintic with great reported success. More recently their infusion has been recommended in morbid irritability of the bladder. Half an ounce of the dried leaves may be infused in a pint of boiling water, and half a fluidounce given for a dose three times a day.

The flowers also are laxative; and a syrup prepared from them is considerably used, in infantile cases, upon the continent of Europe. Woodville states that a drachm of the dried flowers, or half an ounce in their recent state, given in infusion, is the dose as a vermifuge.

The kernels have more of the peculiar powers of hydrocyanic acid, and therefore require to be used with some caution. Blanched, and rubbed up with hot water, they form an emulsion well adapted to coughs depending on or associated with nervous irritation.

The dried fruit stewed with sugar is an excellent laxative article of diet, suitable to cases of convalescence attended with torpid bowels. W.

AMYLUM. *Lond., Ed.*

Starch.

"Triticum hybernum. *Amylum.*" *Lond.*

Amidon, *Fr.;* Stärkmehl, *Germ.;* Amido, *Ital.;* Almidon, *Span.*

Starch is a proximate vegetable principle contained in most plants, and especially abundant in the various grains, such as wheat, rye, barley, oats, rice, maize, &c.; in other seeds, as peas, beans, chestnuts, acorns, &c.; and in numerous tuberous roots, as those of the potato, (*Solanum tuberosum,*) the sweet potato, (*Convolvulus Batatus,*) the arrow-root, the cassava plant, and different species of Curcuma. The process for obtaining it consists essentially in reducing the substances in which it exists to a state of minute division, agitating or washing them with cold water, straining or pouring off the liquid, and allowing it to stand till the fine fecula which it holds in suspension has subsided. This, when dried, is starch, more or less pure according to the care taken in conducting the process. The starch of commerce is procured chiefly from wheat, sometimes also from potatoes. Our space will not allow us to enter into details in relation to the particular steps of the operation to which these substances are subjected; and the omission is of less consequence, as starch is never prepared by the apothecary.

Starch is white, pulverulent, opaque, and as found in the shops, is usually in columnar masses, having a somewhat crystalline aspect, and producing a peculiar sound when pressed between the fingers. It is insoluble in alcohol, ether, and cold water; but unites with boiling water, which, on cooling, forms with it a soft semi-transparent paste, or a gelatinous opaline solution, according to the proportion of starch employed. The paste, placed on folds of blotting paper, renewed as they become wet, abandons its water, contracts, and assumes the appearance of horn. If the proportion of starch be very small, the solution after slowly depositing a very minute quantity of insoluble matter, continues permanent, and upon being evaporated yields a semi-transparent mass, which is partially soluble in cold water. The starch has, therefore, been modified by the combined agency of water and heat; nor can it be restored to its original condition. Exposed, in the dry state, to a temperature somewhat above 212°, it undergoes, according to Caventou, a similar modification; and a degree of heat sufficient to roast it slightly converts it into a substance soluble in cold water, and applicable to the same purposes as gum in the arts. The same change in regard to solubility is, to a certain extent, produced by mechanical means, as by trituration in a mortar; and that the effect is not the result of heat evolved by friction, is evinced by the fact that it takes place when the starch is triturated with water. The soluble substance which results from the action of heat, was supposed by Caventou to be identical with that produced during the fermentation of starch, upon which De Saussure had previously conferred the name of *amidine;* but new opinions upon the subject are now entertained by chemists, in conformity with the views originally presented by Raspail, and subsequently confirmed and extended by Guibourt, Guérin, and others. According to these views, starch consists of organized granules, which, examined by the microscope appear to be of various form and size. These granules consist of a thin exterior pellicle or tegument, and of an interior substance, the former wholly insoluble, the latter soluble in water. The former constitutes, according to M. Payen, only 4 or 5 thousandths of the weight of starch, according to M. Guérin, who, however, did not obtain it entirely pure, as much as 2.2 per cent. In relation to the interior portion different opinions are entertained. M. Guérin thinks that it consists of two distinct substances, one soluble in cold water, which he calls *amidine*, the other soluble at first in boiling water but becoming insoluble by evaporation, which he distinguishes by the name of *soluble amidin*, while upon the substance of which the teguments consist, he confers the name of *tegumentary amidin.* Thus, when one part of starch is boiled for fifteen minutes in one hundred parts of water, and the liquid is allowed to stand, a small portion, consisting of the broken teguments, is gradually deposited. If the solution be now filtered and evaporated, another portion is deposited which cannot afterwards be dissolved. This is the *soluble amidin.* When wholly deprived of this portion and evaporated to dryness, the solution yields the part soluble in cold water, or the *amidine.* According to MM. Payen and Persoz, the interior portion of the globules consists only of a single substance, which is converted into the two just mentioned by the agency of water; and Thenard is inclined to the same opinion. Starch, in its perfect state, is not affected by cold water, because the exterior insoluble tegument prevents the access of the liquid to the interior portion; but when the pellicle is broken by the agency of heat, or by mechanical means, the fluid is admitted, and the starch partially dissolved.

Iodine forms with starch, whether in its original state or in solution, a blue compound; and the tincture of iodine is the most delicate test of its presence in any mixture. The colour varies somewhat according to the proportions employed. When the two substances are about equal, the compound is of a beautiful indigo blue; if the iodine is in excess, it is blackish-blue; if the starch, violet blue. A singular property of the iodide of starch is that its solution becomes colourless if heated, and afterwards recovers its blue colour upon cooling. Alkalies unite with starch, forming soluble compounds, which are decomposed by the acids, the starch being precipitated. It is thrown down from its solution by lime water and baryta water, forming insoluble compounds with these earths. The solution of subacetate of lead precipitates it in combination with the oxide of the metal. It is dissolved by the diluted acids, which, by long boiling, convert it first into *dextrine*,* and ultimately into a saccharine substance similar to the sugar of grapes. This result is perhaps most readily obtained by means of sulphuric acid. A similar conversion into dextrine and the sugar of grapes is effected by means of a principle called *diastase*, recently discovered by MM. Payen and Persoz in the seeds of barley, oats, and wheat, after germination. (See *Hordeum.*) Strong muriatic and nitric acids dissolve it; and the latter, by the aid of heat, converts it into oxalic and malic acids. Concentrated sulphuric acid decomposes it. Mixed with hot water and exposed to a temperature of about 70°, it undergoes fermentation, which results in the formation of several distinct principles, among which are sugar, a gummy substance (perhaps *dextrine*), and a modification of starch which De Saussure called *amidine.*

Starch may be made to unite with tannin by boiling their solutions together; and a compound results, which, though retained by the water while hot, is deposited when it cools. Hence the precipitate which takes place in the decoction of Peruvian bark, in which both these principles are contained.

Starch, as obtained from different substances, is somewhat different in its characters. That from wheat, when examined by a microscope, is found to consist of smaller globules than that from the potato. It is usually, moreover, harder and more adhesive, owing, according to Guibourt, to the escape of a portion of the interior substance of the granules in the act of grinding the grain. This attracts some moisture from the air, and thus becoming glutinous, acts as a bond between the unbroken globules. The fecula from the root of the *Maranta arundinacea*, commonly called *arrow-root*, is in grains much larger and more shining than those of wheat starch, and quite transparent when examined by the microscope. Hence the powder in mass is of a less brilliant whiteness. The granules are intermediate in size between those of the fecula of wheat and those of the potato starch. In the last they are largest. In other respects these three forms of starch are closely similar. *Tapioca* differs in being partially soluble in cold water, as well as in its consistence. (See *Tapioca.*) This is attributable to the circumstance that it is granulated upon heated plates of iron, which cause many of the granules to burst. A form of fecula is procured from the same root, which bears a close resemblance to arrow-root, differing only in the smaller size of its granules, and their greater uniformity, as evinced by examination by the microscope. This fecula is prepared by drying in the open air, without the assistance of heat. It is called *moussache* in France. *Sago* differs from the ordinary forms of starch, rather in the degree of its aggregation than in any essential quality. It is scarcely at all soluble in cold water; and the microscope shows that it consists of small unbroken granules like those of the potato, closely pressed and often matted together. If prepared with heat, the degree of it must have been insufficient to produce much change in the integrity of the organized granules.

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* *Dextrine* is a substance resembling gum in appearance and properties, but differing from it in not affording mucic acid by the action of nitric acid. It is largely dissolved by water, hot or cold, and forms a mucilaginous solution, from which it is precipitated by alcohol. This fluid has no action on dextrine.

Starch consists, according to Berzelius, of 6.674 parts of hydrogen, 44.250 of carbon, and 49.076 of oxygen in the hundred. The results obtained by Gay-Lussac and Thenard are nearly the same.

Medical Properties, &c. Starch is nutritive and demulcent, but in its ordinary form is seldom administered internally. Powdered and dusted upon the skin, it is sometimes used to absorb irritating secretions, and prevent excoriation. Dissolved in hot water and allowed to cool, it is often employed in enemata, either as a vehicle of other substances, or as a demulcent application in irritated states of the rectum.

Off. Prep. Mucilago Amyli, *Lond., Ed., Dub.;* Pulvis Tragacanthæ Comp., *Lond.;* Trochisci Gummosi, *Ed.* W.

◆

AMYRIDIS GILEADENSIS RESINA. *Ed.*

Balsam of Gilead.

Baume de la Mecque, *Fr.;* Mekkabalsam, *Germ.;* Balsamo della Mecca, *Ital.;* Opobalsamo, Balsamo de Meca, *Span.*

The genuine Balsam of Gilead is the resinous juice of the *Amyris Gileadensis* of Linn., the *Balsamodendron Gileadense* of Kunth, a small evergreen tree, growing on the Asiatic and African shores of the Red Sea. It was in high repute with the ancients, and still retains its value in the estimation of the eastern nations, among whom it is employed both as a medicine and cosmetic. In western Europe, and in this country, it is never found in a state of purity, and its use has been entirely abandoned. We notice it here, simply because it is retained by the Edinburgh College. It possesses no medical properties which do not exist in other balsamic or terebinthinate juices.

It was formerly known by the name of *opobalsamum*, while the dried twigs of the tree were called *xylobalsamum*, and the dried fruit, *carpobalsamum.* W.

◆

ANCHUSÆ TINCTORIÆ RADIX. *Ed.*

Alkanet Root.

Orcanette, *Fr.;* Alkanne, *Germ.;* Alcanna, *Ital.;* Bugula, *Span.*

Anchusa. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Boragineæ.

Gen. Ch. *Corolla* funnel-shaped; the throat closed with arches. *Seeds* sculptured at the base. *Willd.*

Anchusa tinctoria. Willd. *Sp. Plant.* i. 758; Woodv. *Med. Bot.* p. 314. t. 106. The *dyer's alkanet* has a perennial root, with round, rough, hairy, branching, lax, herbaceous stems, from six inches to a foot or more in height, and furnished with long, lanceolate, obtuse, hairy, sessile leaves. The flowers are reddish-purple, and disposed in terminal bracteate spikes, with bractes longer than the calyx, which is five-parted. The arches are enclosed beneath the anthers in the tube of the corolla.

This species of Anchusa is a native of the Grecian Archipelago and the South of Europe. It is said in some medical works to be cultivated abundantly in the South of France; but the plant referred to is probably the *Lithospermum tinctorium* of Linnæus and De Candolle, the *Anchusa tinctoria* of Lamarck, which is a native of that country, and the root of which is considered as the true alkanet by the French writers.

Alkanet, as found in the shops, is in pieces three or four inches in length, from the thickness of a quill to that of the little finger, somewhat twisted, consisting of a dark-red, easily separable bark, and an internal ligneous portion, which is reddish externally, whitish near the centre, and composed of numerous distinct, slender, cohering fibres. As it comes to us it is usually much decayed internally, very light, and of a loose almost spongy texture. The fresh root has a faint odour and a bitterish astringent taste; but when dried it is nearly inodorous and insipid. Its colouring principle, which abounds most in the cortical part, is soluble in alcohol, ether, and the oils, to which it imparts a fine deep red; but is insoluble in water. It may be obtained separate by first exhausting the root with water, and then treating it with a weak solution of the carbonate of potassa or soda, from which the colouring principle may be precipitated by an acid. According to Pelletier, by whom it was discovered, it possesses decided acid properties, uniting with the alkalies and earths to form neutral compounds, which are of a blue colour, and have the singular property of being soluble in alcohol and ether. He calls it *anchusic acid*, and states that it is capable of being sublimed unchanged. (*Journ. de Pharm.* xix. 105.) The tincture of alkanet has its colour deepened by the acids, changed to blue by the alkalies, and again restored by neutralizing the latter substances. It may, therefore, be used as a test. The extract obtained by evaporating the tincture is dark brown.

Medical Properties and Uses. Alkanet root is somewhat astringent, and was formerly applied to the treatment of several diseases; but it is now employed exclusively for colouring oils, ointments, and plasters, which are beautifully reddened by one-fortieth of their weight of the root. It is said also to be used in the preparation of spurious Port wine. W.

◆

ANETHI SEMINA. *Lond.*

Dill Seeds.

"Anethum graveolens. *Semina.*" *Lond.*

Aneth a odeur forte, *Fr.;* Dill, *Germ.;* Aneto, *Ital.;* Eneldo, *Span.*

Anethum. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferæ.

Gen. Ch. *Fruit* nearly ovate, compressed, striated. *Petals* involuted, entire. *Willd.*

Anethum graveolens. Willd. *Sp. Plant.* i. 1469; Woodv. *Med. Bot.* p. 125. t. 48. Dill is an annual plant, three or four feet high, with a long spindleshaped root; an erect, striated, jointed, branching stem; and bipinnate or tripinnate, glaucous leaves, which stand on sheathing footstalks, and have linear and pointed leaflets. The flowers are yellow, and in large, flat, terminal umbels, destitute of involucre. The plant is a native of Spain, Portugal, and the South of France. It is cultivated in all the countries of Europe, and has been introduced into our own gardens; but is much less esteemed than its congener, the *A. Fœniculum.* The seeds only are used. They are usually rather more than a line in length, of an oval shape, thin, concave on one side, convex and striated on the other, of a brown colour, and surrounded by a yellowish membranous expansion. Their smell is strong and aromatic, but less agreeable than that of fennel-seed; their taste moderately warm and pungent. These properties depend on a volatile oil, which may be obtained separate by distillation. It is of a pale yellow colour, and of the sp. gr. 0.881. The bruised seeds impart their virtues to alcohol and to boiling water.

Medical Properties. Dill seeds have the properties common to the aromatics, but are very seldom used in this country. They may be given in powder or infusion. The dose is from fifteen grains to a drachm.

Off. Prep.—Aqua Anethi, *Lond.* W.

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ANGELICA. *U.S. Secondary.*

Angelica.

"Angelica atropurpurea. Planta. *The plant.*" *U.S.*

Angelica. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferae.

Gen. Ch. *Fruit* elliptic, compressed, somewhat solid and corticate, ridges three, dorsal acute, intervals grooved, margin alated. *General involucre* none. (*Sprengel.*) *Umbel* large, many-rayed, spreading; *umbellet* dense, subhemispheric; *involucell* about eight-leaved. *Calyx* five-toothed. *Petals* inflected. *Nutall.*

Angelica atropurpurea. Willd. *Sp. Plant.* i. 1430. This indigenous species of Angelica, sometimes called *masterwort*, has a perennial purplish root, and a smooth herbaceous stem, the dark colour of which has given rise to the trivial name of the plant. The leaves are ternate, and supported by very large inflated petioles. The partitions of the leaf are nearly quinate, with ovate, acute, deeply serrate, somewhat lobed leaflets, of which the three terminal are confluent. The flowers are greenish-white.

The purple angelica extends throughout the United States from Canada to Carolina, growing in meadows and marshy woods, and flowering in June and July. It is smaller than the *A. Archangelica*, with a less succulent stem. The whole plant is officinal. It has a strong odour, and a warm aromatic taste. The juice of the recent root is acrid, and is said to be poisonous; but the acrimony is dissipated by drying.

Medical Properties, &c. The medical virtues of the plant are similar to those of the garden Angelica of Europe, for which it has been proposed as a substitute. It is, however, little employed. An infusion is occasionally used in flatulent colic; and we are told that the stems are sometimes candied by the country people. W.

ANGELICA ARCHANGELICA. Semina. *Dub.*

ANGELICÆ ARCHANGELICÆ RADIX. *Ed.*

The Seeds and Root of Garden Angelica.

Angelique, *Fr.;* Engelwurzel, *Germ.;* Arcangelica, *Ital.;* Angelica, *Span.*

ANGELICA. See ANGELICA. *U.S.*

Angelica Archangelica. Willd. *Sp. Plant.* i. 1428; Woodv. *Med. Bot.* p. 86. t. 35. The *garden angelica* has a long, thick, fleshy, biennial root, furnished with many fibres, and sending up annually a hollow, jointed, round, channeled, smooth, purplish stem, which rises five feet or more in height, and divides into numerous branches. The leaves, which stand upon round fistulous footstalks, are very large, doubly pinnate, with ovate lanceolate, pointed, acutely serrate leaflets, of which the terminal one is three-lobed. The flowers are small, greenish-white, and disposed in very large, many-rayed, terminal umbels, composed of numerous dense, hemispherical umbellets.

This plant is a native of the north of Europe, and is found in the high, mountainous regions in the southern section of that continent, as in Switzerland and among the Pyrennees. It has become an object of culture in various parts of Europe, and may be occasionally met with in the gardens of this country. It flowers during the summer. The whole plant diffuses a fragrant odour, and possesses aromatic properties; but the root and seeds only are officinal.

1. *The root* should be dug up in the autumn of the first year, as it is then less liable to become mouldy and worm-eaten than when taken from the ground in the spring. It is spindle-shaped, an inch or more in thickness at its upper extremity, and beset with numerous long descending radicles. The fresh root has a yellowish-gray epidermis, a fleshy yellow parenchyma, and when wounded yields a honey-coloured juice, which has all the aromatic properties of the plant. The dried root is grayish-brown and much wrinkled externally, whitish and spongy within, breaking with a starchy fracture, exhibiting shining resinous points. It is very apt to be attacked by worms. The smell is strong and fragant, the taste at first sweetish, afterwards warm, aromatic, bitterish, and somewhat musky. These properties are extracted by alcohol, and less perfectly by water. The constituents of the root, according to John, are an essential oil, gum, inulin, bitter extractive, an acrid resin, lignin, and a peculiar principle soluble only in a solution of potassa. Five hundred parts yielded by distillation nearly four parts of volatile oil.

2. *The seeds* are two or three lines long, oval, obtuse or somewhat notched at the ends, flat, and marked with a longitudinal furrow on one side, convex with three angular ridges on the other. They are ash-coloured, and have the same smell and taste as the root. M. Fée says that they keep well.

Medical Properties. Angelica is an elegant aromatic tonic; but is little employed in the United States. The Laplanders, in whose country it flourishes, are said to esteem it highly as a condiment and medicine. In Europe, the stems are frequently made into a preserve, and used in desserts in order to excite the stomach. The dose of the root or seed in substance is from thirty grains to a drachm.

Off. Prep.—Spiritus Anisi Compositus. *Dub.* W.

ANGUSTURA. *U.S.*

Angustura Bark.

"Galipea Officinalis. *Hancock.* Bonplandia trifoliata. *Plant. Equinoct.* Cortex. *The Bark.*" *U.S.*

Off. Syn. CUSPARIÆ CORTEX. Cusparia febrifuga. Cortex. *Lond.;* BONPLANDIÆ TRIFOLIATÆ CORTEX. Angustura. *Ed.;* ANGUSTURA. BONPLANDIA TRIFOLIATA. Cortex. *Dub.*

Angusture, *Fr.;* Angusturarinde, *Germ.;* Corteçcia dell' Angustura, *Ital.;* Corteza de Angostura, *Span.*

The subject of Angustura bark, in its botanical relations, has been involved in some confusion. The drug was at first supposed to be derived from a species of Magnolia, and in Europe was referred by some to the *Magnolia glauca* of this country. Humboldt and Bonpland were the first to enlighten the medical public as to its true source; though the name which it bore was sufficient to indicate the neighbourhood of its growth. These gentlemen, when at Angustura, a South American city upon the banks of the Orinoco, received specimens of the foliage of the plant from which the bark was obtained; and afterwards believed that they had found this same plant in a tree growing in the vicinity of Cumana. This latter they had the opportunity of personally inspecting, and were therefore enabled to describe accurately. Unable to attach it to any known genus, they erected it into a new one, with the title of *Cusparia*, a name of Indian origin, to which they added the specific appellation of *febrifuga.* On the authority of these botanists, the *Cusparia febrifuga* was generally believed to be the true source of the medicine, and was recognised as such by the London College. A specimen having in the mean time been sent by them to Willdenow, the name of *Bonplandia* was imposed on the new genus by that celebrated botanist; and was subsequently adopted by Humboldt and Bonpland themselves, in their great work on equinoctial plants. Hence the title of *Bonplandia trifoliata*, by which the tree is described in many works on materia medica. De Candolle, however, having found in the description all the characters of the genus *Galipea* of Aublet, has rejected both these titles, and proposes to substitute that of *Galipea Cusparia.* After all these commutations, however, it appears from the researches of Dr. Hancock, who resided for several months in the country of the Angustura bark tree, that the plant described by Humboldt and Bonpland is not that which yields the medicine, but probably another species of the same genus, which these authors had mistaken for it, having been led into error by the imperfect specimens which they received.* Among other striking differences in the two plants, is that of their size; the tree described by Humboldt and Bonpland being of great magnitude, attaining the height of sixty or eighty feet, while that from which the bark is obtained is never higher than twenty feet. Hancock proposes for the latter the title of *Galipea officinalis*, which has been adopted in the Pharmacopœia of the United States.

GALIPEA. *Sex. Syst.* Diandria Monogynia.—*Nat. Ord.* Diosmeæ.

Gen. Ch. *Corolla* inferior, irregular, four or five cleft, hypocrateriform. *Stamens* four; two sterile. *Loudon's Encyc.*

Galipea officinalis. Hancock, *Trans. Lond. Medico-Bot. Soc.*—*G. Cuspa-*

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* See a paper by John Hancock, M. D., in the Transactions of the London Medico-Botanical Society.

ria. De Cand. *Prodrom.* i. 730. This is a small tree, irregularly branched, rising to the medium height of twelve or fifteen feet, with an erect stem from three to five inches in diameter, and covered with a smooth gray bark. The leaves are alternate, petiolate, and composed of three leaflets, which are oblong, pointed at each extremity, from six to ten inches in length, from two to four in breadth, and supported upon the common petiole by short leafstalks. They are very smooth and glossy, of a vivid green colour, marked occasionally with small whitish round spots, and when fresh, of a strong odour resembling that of tobacco. The flowers are numerous, white, arranged in axillary and terminal, peduncled racemes, and exhale a peculiar unpleasant odour. The fruit consists of five bivalve capsules, of which two or three are commonly abortive. The seeds, two of which are contained in each capsule, one often abortive, are round, black, and of the size of a pea.

This tree grows in great abundance on the mountains of Carony, situated between the 7th and 8th degrees of N. latitude; and is well known in the missions of Tumeremo, Uri, Alta Gracia, and Cupapui, near the Orinoco, upwards of two hundred miles from the ocean. It flourishes at the height of from six hundred to one thousand feet above the level of the sea. Its elegant white blossoms, which appear in vast profusion in August and September, add greatly to the beauty of the scenery.

The bark is generally brought from the West India ports packed in casks; but, according to Mr. Brande, the original package, formed in Angustura or its neighbourhood, consists of the leaves of a species of palm, surrounded by a network made of sticks.

Properties. The pieces are of various lengths, for the most part slightly curved, rarely quilled, sometimes nearly flat, from half a line to a line or more in thickness, pared away towards the edges, covered externally with a light yellowish-gray or whitish wrinkled epidermis, and internally of a yellowish-fawn colour. They are very fragile, breaking with a short resinous fracture, and yield, on being pulverized, a pale yellow powder; but when macerated for a short time in water, they become soft and tenacious, and may be cut into strips with scissors. The smell of Angustura bark is peculiar and disagreeable when fresh, but becomes fainter with age; the taste is bitter and slightly aromatic, leaving a sense of pungency at the end of the tongue. According to Fischer, it contains volatile oil, bitter extractive, a hard and bitter resin, a soft resin, a substance analogous to caoutchouc, gum, lignin, and various salts. The active principles are probably the volatile oil and bitter extractive. The bark imparts its virtues to water and alcohol.

Dr. A. T. Thomson states that precipitates are produced with the infusion by the solutions of sulphate of iron, tartrate of antimony and potassa, sulphate of copper, acetate and subacetate of lead, bichloride of mercury, nitrate of silver, and pure potassa; by nitric and sulphuric acids; and by the infusions of galls and yellow cinchona; but how far these substances are medicinally incompatible with the bark, it would be difficult in the present state of our knowledge to determine.

False Angustura. Under this title, the European writers on materia medica describe a bark which has been introduced on the continent mixed with the true Angustura bark, and, possessing poisonous properties, has in some instances produced unpleasant effects when prescribed by mistake for that medicine. It is distinguished by its greater thickness, hardness, weight, and compactness; by its dull and brownish fracture; by the appearance of its epidermis, which is sometimes covered with a ferruginous efflorescence, sometimes is yellowish-gray, and marked with prominent white spots; by the brownish colour and smoothness of its internal surface; by the white slightly yellow powder which it yields; by its total want of odour, and its intense tenacious bitterness. When steeped in water it does not become soft like the true Angustura. Analyzed by Pelletier and Caventou, it was found to contain a peculiar alkaline principle which they called *brucia*, and upon which its poisonous operation depends. Of this alkali we shall have occasion to speak in another place. (See *Nux Vomica.*) In consequence of its presence, a drop of nitric acid upon the internal surface of the bark produces a deep blood-red spot. The same acid applied to the external surface renders it emerald green. In the true Angustura bark, a dull red colour is produced by the acid on both surfaces. The *false Angustura* was at first supposed to be derived from the *Brucea antidysenterica;* but as this tree is a native of Africa, the opinion was abandoned when it was considered that the bark in question was brought from South America. Botanists now generally refer it to an unknown species of Strychnos; and the correctness of this reference is rendered probable by the fact, that the *nux vomica*, and *bean of St. Ignatius*, both products of species of Strychnos, have been found to contain *brucia.*

Medical Properties and Uses. Angustura bark had been long used by the natives of the country where it grows, before it became known in Europe. From the continent its employment extended to the West Indies, where it acquired considerable reputation. It was first taken to Europe about fifty years since, and attracted particular attention among the English physicians. It is now ranked among the officinal remedies throughout Europe and America; but has not sustained the estimation in which it was at first held; and in the United States is not much prescribed. Its operation is that of a stimulant tonic. In large doses it also evacuates the stomach and bowels, and is often employed for this purpose in South America. It was at one time considerably used as a febrifuge in the place of Peruvian bark; but has not been found generally successful in the intermittents of northern latitudes. It is said to be particularly efficacious in bilious diarrhœas and dysenteries; and has been recommended in dyspepsia, and other diseases in which a tonic treatment is demanded. The testimony, however, of practitioners in Europe and the United States, is not strongly in its favour; and it is probably better adapted to tropical diseases, than to those of temperate climates. Hancock employed it very extensively in the malignant bilious intermittent fevers, dysenteries, and dropsies of Angustura and Demarara; and speaks in the strongest terms of its efficacy in these complaints. The form in which he used it was that of fermented infusion, as recommended by the native practitioners. It has this advantage over Peruvian bark, that it is less apt to oppress the stomach.

It may be given in powder, infusion, tincture, or extract. The dose in substance is from ten to thirty grains. In larger quantities it is apt to produce nausea. From five to fifteen grains is the dose of the extract, which, however, according to Dr. Hancock, is inferior to the powder or infusion. To obviate nausea, it is frequently combined with aromatics.

Off. Prep. Infusum Angusturæ, *U.S.*, *Lond.;* Tinctura Angusturæ, *U.S.*, *Ed.*, *Dub.* W.

ANISUM. *U.S.*

Anise.

"Pimpinella Anisum. Semina. *The Seeds.*" *U.S.*

Off. Syn. ANISI SEMINA. Pimpinella Anisum. Semina. *Lond.;* PIMPINELLÆ ANISI SEMINA. *Ed.;* ANISUM. PIMPINELLA ANISUM. Semina. *Dub.*

Graines d'anis, *Fr.;* Anissame, *Germ.;* Semi d'aniso, *Ital.;* Simiente de anis, *Span.;* Anison, *Arab.*

PIMPINELLA. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferæ.

Gen. Ch. Fruit ovate-oblong. *Petals* inferior. *Stigma* nearly globular. *Willd.*

Pimpinella Anisum. Willd. *Sp. Plant.* i. 1473; Woodv. *Med. Bot.* p. 135. t. 52. This is an annual plant, about a foot in height, with an erect, slightly scabrous, striated, and branching stem. The leaves are petiolate, the lower roundish-cordate, entire or irregularly three-lobed, the upper three-parted or ternate. The flowers are white, and in terminal compound umbels, destitute of involucres.

Anise is a native of Egypt and the Levant, but has been introduced into the South of Europe, and is cultivated in various parts of that continent. It is also cultivated occasionally in the gardens of this country. The seeds are abundantly produced in Malta and Spain. The Spanish are smaller than the German or French, and are usually preferred.

Anise seeds are about a line in length, oval, striated, somewhat downy, attached to their footstalks, and of a greenish-brown colour, with a shade of yellow. Their odour is fragrant and increased by friction; their taste warm, sweet, and aromatic. These properties, which depend on a peculiar volatile oil, are imparted sparingly to boiling water, freely to alcohol. The volatile oil exists in the envelope of the seeds, and is obtained separate by distillation. (See *Oleum Anisi.*) Their internal substance contains a bland fixed oil. By expression, a greenish oil is obtained, which is a mixture of the two. The seeds are sometimes adulterated with small fragments of argillaceous earth; and their aromatic qualities are occasionally impaired, in consequence of a slight fermentation which they are apt to undergo in the mass, when collected before maturity.

The *Star aniseed*, the *badiane* of the French writers, though analogous in sensible properties to the common aniseed, is derived from a different plant, being the fruit of the *Illicium anisatum*, an evergreen tree growing in China, Japan, and Tartary. The fruit consists of from five to ten brownish ligneous capsules, four or five lines long, united together in the form of a star, each containing a brown shining seed. It is much used in France to flavour liquors, and the volatile oil upon which its aromatic properties depend is imported into this country from the East Indies, and sold as common oil of aniseed, to which, however, it is much superior. *Togno and Durand.*

Medical Properties and Uses. Anise is a grateful aromatic carminative; and like several other seeds of a similar character, is supposed to have the property of increasing the secretion of milk. In Europe it is much employed in flatulent colic, and as a corrigent of griping or unpleasant medicines; but in this country fennel-seed is usually preferred. Anise may be given bruised, or in powder, in the dose of twenty or thirty grains or more. The infusion is less efficient. The volatile oil may be substituted for the seeds in substance. Much use is made of this aromatic for imparting flavour to liquors.

Off. Prep. Oleum Anisi, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Spiritus Anisi, *Lond.*
W.

ANTHEMIS. *U.S.*

Chamomile.

"Anthemis nobilis. Flores. *The Flowers.*" *U.S.*

Off. Syn. ANTHEMIDIS FLORES. Anthemis nobilis. Flores Simplices. *Lond.;* ANTHEMIDIS NOBILIS FLORES, *Ed.;* CHAMÆMELUM. ANTHEMIS NOBILIS. Flores. *Dub.*

Camomille Romaine, *Fr.;* Römische Kamille, *Germ.;* Camomilla Romana, *Ital.;* Manzanilla Romana, *Span.*

ANTHMIS. *Sex. Syst.* Syngenesia Superflua.—*Nat. Ord.* Compositæ Corymbiferæ.

Gen. Ch. Receptacle chaffy. *Seed down* none or a membranaceous margin. *Calyx* hemispherical, nearly equal. *Florets of the ray* more than five. *Willd.*

Several species of Anthemis have been employed in medicine. The *A. nobilis*, which is the subject of the present article, is by far the most important. The *A. Cotula* or May-weed is also recognised by the U.S. Pharmacopœia. (See *Cotula.*) The *A. Pyrethrum*, which affords the pellitory root, is ranked among the officinal plants by the Dublin College. (See *Pyrethrum.*) The *A. arvensis*, a native of this country and of Europe, bears flowers which have an acrid bitter taste, and possess medical properties analogous though much inferior to those of the common chamomile, for which they are said to be sometimes substituted in Germany. They may be distinguished by their want of smell. The *A. tinctoria* is occasionally employed as a tonic and vermifuge in Europe, and is admitted among the officinal medicines by the French Codex.

Anthemis nobilis. Willd. *Sp. Plant.* iii. 2180; Woodv. *Med. Bot.* p. 47. t. 19. This is an herbaceous plant with a perennial root. The stems are from six inches to a foot long, round, slender, downy, trailing, and divided into branches, which turn upwards at their extremities. The leaves are bipinnate; the leaflets small, thread-like, somewhat pubescent, acute, and generally divided into three segments. The flowers are solitary, with a yellow convex disc, and white rays. The calyx is common to all the florets, of a hemispherical form, and composed of several small imbricated hairy scales. The receptacle is convex, prominent, and furnished with rigid bristle-like *paleæ.* The florets of the ray are numerous, narrow, and terminated with three small teeth. The whole herb has a peculiar fragrant odour, and a bitter aromatic taste. The flowers only are officinal.

This plant is a native of Europe, and grows wild in all the temperate parts of that continent. It is also largely cultivated for medicinal purposes. In France, Germany, and Italy, it is generally known by the name of Roman chamomile. The flowers become double by cultivation, and in this state are usually preferred; though, as the sensible properties are found in the greatest degree in the disc, which is not fully developed in the double flowers, the single are the most powerful, and are exclusively directed by the London College. It is rather, however, in aromatic flavour, than in bitterness, that the radial florets are surpassed by those of the disc. If not well and quickly dried, the flowers lose their beautiful white colour, and are less efficient as a medicine. Those which are whitest should be preferred.

Though not a native of America, chamomile grows wild in some parts of this country, and is occasionally cultivated in our gardens for family use, the whole herb being employed.* The medicine, as found in our shops, consists chiefly of the double flowers, and is imported from Germany and England. From the former country are also occasionally imported, under the name of chamomile, the flowers of the *Matricaria Chamomilla*, a plant belonging to the same family with the Anthemis, and closely allied to it in sensible as well as medicinal properties. The flowers of the Matricaria are, however, less pleasant to the smell, and are considerably weaker than the true chamomile. As they reach us they are also much smaller, and differ, moreover, in exhibiting a much larger proportion of the disc florets, compared with those of the ray. They are much used in Germany.

Properties. Chamomile flowers, as usually found in the shops, are large, almost spherical, of a dull-white colour, a fragrant odour, and a warmish, bitter, aromatic taste. When fresh, their smell is much stronger, and was fancied by the ancients to resemble that of the apple. Hence the name *chamæmelum;* and it is somewhat singular that the Spanish name *manzanilla* has a similar signification.† The flowers impart their odour and taste to both water and alcohol, the former of which, at the boiling temperature, extracts nearly one-fourth of their weight. They have not been accurately analyzed, but are known to contain a volatile oil, a bitter extractive matter, resin, and a small quantity of tannin. The first two are probably their active ingredients. (See *Oleum Anthemidis.*)

Medical Properties and Uses. Chamomile is a mild tonic, in small doses acceptable and corroborant to the stomach, in larger quantities capable of acting as an emetic. In cold infusion it is often advantageously used in cases of enfeebled digestion, whether occurring as an original affection, or consequent upon some acute disease. It is especially applicable to that condition of general debility, with languid appetite, which often attends convalescence from idiopathic fevers. As a febrifuge it has also acquired much reputation, being frequently prescribed in remittents, when the subsidence of action between the paroxysms is so considerable as to demand the use of tonics, but is not sufficiently complete to admit of a resort to Peruvian bark or its preparations. Chamomile in substance has, in some instances, proved effectual in the treatment of intermittents; but we have so many other remedies more efficient in these cases, that it is now seldom if ever employed. The tepid infusion is very often given to promote the operation of emetic medicines, or to assist the stomach in relieving itself when oppressed by its contents. The flowers are sometimes applied externally as fomentations in cases of irritation or inflammation of the abdominal viscera, and as gentle incitants in flabby, ill-conditioned ulcers. The dose of the powder as a tonic is from half a drachm to a drachm three or four times a day, or more frequently, according to the end proposed. The infusion is usually preferred. The decoction and extract cannot exert the full influence of the medicine, as the volatile oil, upon which its virtues partly depend, is driven off at the boiling temperature.

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* Eaton tells us, in his Manual of Botany, that he has seen it growing wild near Pittsfield, Massachusetts; and Nuttal states that it is naturalized near Lewistown in Delaware.

† Chamæmelum from χαμαι on the ground, and μηλον an apple. Manzanilla signifies a little apple.

Off. Prep. Decoctum Anthemidis Nobilis, *Ed.;* Decoctum Chamæmeli Comp., *Dub.;* Decoctum Malvæ Comp., *Lond.;* Extractum Anthemidis, *U.S., Lond., Ed., Dub.;* Infusum Anthemidis, *U.S., Lond., Ed. Dub.;* Oleum Anthemidis, *Lond. Ed.* W.

ANTIMONIUM.

Antimony.

Regulus of antimony; Stibium, *Lat.;* Antimoine, *Fr.;* Antimon, Spiessglas, *Germ.;* Antimonio, *Span.; Ital.*

Antimony, in the metallic state, is not officinal in the British or United States Pharmacopœias; but as it enters into the composition of a number of important pharmaceutical agents and medicines, we have thought it proper to notice it under a distinct head.

Antimony exists in nature in four states; 1. As metallic antimony; 2. As an oxide; 3. As a sulphuret; and 4. As a sulphuretted oxide. It is found principally in France and Germany.

Extraction. Nearly all the antimony of commerce is extracted from the native sulphuret, which is by far the most abundant ore of this metal. The ore is first separated from its gangue by fusion. It is then reduced to powder, and placed on the floor of a reverberatory furnace, where it is subjected to a gentle heat, being constantly stirred about with an iron rake. The heat should not be sufficient to cause fusion. This process of roasting takes a good deal of time, and is known to be completed, when the matter is reduced to the state of a dull grayish-white powder. By this treatment the antimony is oxidized, and nearly all the sulphur dissipated in the form of sulphurous acid gas: a little sulphuret, however, remains undecomposed. The matter is then mixed either with tartar, or with charcoal impregnated with a concentrated solution of carbonate of soda, and the mixture introduced into crucibles, which are placed in a melting furnace. Heat being applied, the charcoal reduces the oxide of antimony, while the alkali unites with the undecomposed sulphuret, and forms with it melted scoriæ, which cover the reduced metal and diminish its loss by volatilization. The metal obtained is then fused a second time for the purpose of purification.

In Scotland, the sulphuret of antimony is decomposed by the superior affinity of iron for the sulphur; but the metal obtained by this process is of bad quality.

Antimony is imported into the United States principally from France, from the ports of Havre and Bordeaux, packed in casks, and most of it arrives at New York. A portion is also shipped from Trieste, from Holland, and occasionally from Cadiz. The Spanish antimony is generally in the form of pigs; the French, in circular cakes of about ten inches in diameter, flat on one side and convex on the other; and the English, in cones. The French is most esteemed. Very little English antimony is at present imported into the United States.

Properties, &c. The time of the discovery of antimony is not known; but, according to Berzelius and Thenard, Basil Valentine was the first to describe the method of obtaining it, in his work, entitled *Currus Triumphalis Antimonii*, published towards the end of the fifteenth century. It is a brittle, brilliant metal, ordinarily of a lamellated texture, and of a silver-white colour when pure, but bluish-white as it occurs in commerce. When rubbed between the fingers, it communicates to them a sensible odour. Its sp. gr. is 6.7, and its fusing point 810° or about a red heat. On cooling after fusion, it assumes a crystalline structure, and an appearance on the surface bearing some resemblance to a fern leaf. When strongly heated it takes fire, and burns with emission of white vapours, consisting of protoxide, formerly called *argentine flowers of antimony.* A small portion being fused, and then thrown from a moderate height upon a plane surface, divides into numerous globules, which burn rapidly as they pass through the air. It forms three combinations with oxygen; one oxide,—sesquioxide of antimony, and two acids,—antimonious and antimonic acids. Its equivalent number, according to Berzelius, is 64.6; and the sesquioxide contains one and a half; antimonious acid two, and antimonic acid two and a half equiv. of oxygen. The sesquioxide only is a true salifiable base, and it is this oxide which is uniformly present in the active medicinal preparations of this metal. It will be noticed under another head. (See *Antimonii Oxydum Nitromuriaticum*, Dub.) *Antimonic acid* is in the form of a lemon-coloured powder, which may be prepared by oxidizing the metal by digestion in nitric acid, and then driving off the excess of nitric acid by a heat not exceeding 600°. When exposed to a red heat, it parts with oxygen, and is converted into *antimonious acid.* This is a white powder, and, though medicinally inert, frequently forms a large proportion of the preparation called antimonial powder. (See *Pulvis Antimonialis.*)

The following table exhibits a view of the different officinal preparations of antimony:—

I. SULPHURETTED:—
  1. Antimonii Sulphuretum, *U.S.*, *Lond.*, *Dub.;* Sulphuretum Antimonii, *Ed.*
  2. Antimonii Sulphuretum Præparatum, *U.S.*, *Dub.;* Sulphuretum Antimonii Præparatum, *Ed.*
  3. Antimonii Sulphuretum Præcipitatum, *U.S.*, *Lond.;* Sulphuretum Antimonii Præcipitatum, *Ed.;* Sulphur Antimoniatum Fuscum, *Dub.*

II. OXIDIZED:—
  1. *Sesquioxide.* Antimonii Oxydum Nitromuriaticum, *Dub.*
  2. *Sesquioxide combined with sulphuret.* Antimonii Vitrum, *Lond.*
  3. *Sesquioxide combined with tartaric acid and potassa.* Antimonii et Potassæ Tartras, *U.S.*, *Dub.;* Antimonium Tartarizatum, *Lond.;* Tartras Antimonii, *Ed.* *Dissolved in wine.* Vinum Antimonii, *U.S.;* Vinum Tartratis Antimonii, *Ed.* *Dissolved in diluted alcohol.* Vinum Antimonii Tartarizati, *Lond.;* Liquor Tartari Emetici, *Dub.* *Mixed with lard.* Unguentum Tartari Emetici, *Dub.*
  4. *Sesquioxide and antimonious acid mixed with phosphate of Lime.* Pulvis Antimonialis, *Lond.*, *Dub.;* Oxidum Antimonii cum Phosphate Calcis, *Ed.*

In Pharmacy, antimony is not much used in the metallic state; the sulphuret being the source, either directly or indirectly, of nearly all its medicinal preparations. (See *Antimonii Sulphuretum.*)

ANTIMONII SULPHURETUM. *U.S.*, *Lond.*, *Dub.*

Sulphuret of Antimony.

Off. Syn. SULPHURETUM ANTIMONII. *Ed.*

Crude antimony, Artificial sulphuret of antimony; Antimoine sulphuré, *Fr.;* Schwefelantimon, Schwefelspiessglas, *Germ.;* Solfuro d'antimonio, *Ital.;* Antimonio crudo, *Span.*

Preparation, &c. The officinal sulphuret of antimony of the Pharmacopœias, is a sesquisulphuret of the metal, and is uniformly placed in the list of the materia medica as an article to be purchased by the apothecary. It is obtained from the native sulphuret, by far the most abundant ore of this metal, by different processes of purification, of which the following is an outline of that generally pursued. The ore is pounded and placed in earthen pots, with perforated bottoms, which are made to rest on others, half buried in the earth. The upper pots are surrounded with wood, which is then kindled. By its combustion the sulphuret is quickly melted, and runs down into the lower pots, leaving the stony and earthy impurities behind. A better process is to use slightly conical earthenware tubes, fixed vertically in a kind of reverberatory furnace, in place of the earthen pots. This arrangement affords facilities for removing the residue of the operation, and permits the melted sulphuret to run out from the furnace, without interrupting the fire, and consequently without loss of time or fuel.

Properties, &c. Sulphuret of antimony is mostly prepared in France and Germany, and comes to the United States principally from the ports of France. It is called in commerce antimony, or crude antimony, and occurs in fused roundish masses, denominated loaves. These are dark-gray externally, and exhibit internally, when broken, a brilliant steel-gray colour, and a radiated or fibrous crystalline texture. Their goodness depends upon their compactness and weight, the largeness and distinctness of the fibres, and their total volatility by heat. The quality of the sulphuret cannot well be judged of, except in mass; hence it ought never to be bought in powder. The powder of the pure sulphuret is reddish-brown; but that of the commercial sulphuret is almost always black. The most usual impurities are lead, iron, and arsenic. Lead may be detected by the texture of the loaves being foliated and indistinctly striated; iron, by a brown colour being produced by deflagration with nitre; and arsenic, by its peculiar smell when the sulphuret is heated. According to Serullas, all the antimonial preparations, except tartar emetic and butter or chloride of antimony, contain a minute portion of arsenic. Tartar emetic is an exception, because, according to this chemist, it separates entirely, in the act of crystallizing, from any minute portion of arsenic in the materials from which it is prepared; the poisonous metal being left behind in the mother-waters of the process.

Composition. Sulphuret of antimony consists of one equivalent of antimony 64.6, and one and a half equiv. of sulphur 24.15=88.75.

Pharmaceutical Uses. Sulphuret of antimony requires to be levigated in order to fit it for exhibition as a medicine. Processes are accordingly given for this purpose in the United States, Edinburgh, and Dublin Pharmacopœias, but not in the London. The medical properties of sulphuret of antimony will accordingly be noticed under the head of the prepared sulphuret, (See *Antimonii Sulphuretum Præparatum.*)

Sulphuret of antimony is used pharmaceutically in a number of preparations. Besides being employed to obtain the prepared sulphuret as just mentioned, and the glass of antimony, (See *Antimonii Vitrum,*) it is used in the following preparations:—Antimonii Sulphuretum Præcipitatum, *Lond.;* Pulvis Antimonialis, *Lond., Ed.;* Tartras Antimonii, *Ed.* In all other preparations in which sulphuretted antimony is required, the *prepared sulphuret* is employed. B.

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ANTIMONII VITRUM. *Lond.*

Glass of Antimony.

Verre d'antimoine, *Fr.;* Spiessglanzglass, *Germ.;* Vetro di antimonio, *Ital.;* Vidrio de antimonio, *Span.*

Of the different Pharmacopœias noticed in this Dispensatory, the London is the only one which at present retains the glass of antimony. After having been omitted by the London College, it was restored in the revised edition of the Pharmacopœia in 1824, but placed in the materia medica list as an article to be purchased. It is defined by the College to be the vitrified sulphuretted oxide of antimony.

Preparation. Glass of antimony is prepared from the sulphuret by a partial roasting and subsequent fusion, conducted in the following manner. The sulphuret is reduced to a coarse powder, and strewed upon a shallow, unglazed, earthen vessel, and then heated gently and slowly, being continually stirred to prevent it from running into lumps. White vapours of sulphurous acid arise; and when these cease, the heat is increased a little to reproduce them. The roasting is continued in this manner, until, at a red heat, no more vapours are given off. The matter is then melted in a crucible with an intense heat, until it assumes the appearance of melted glass, when it is poured out on a heated brass plate.

In this process, part of the sulphur of the sulphuret is driven off by the roasting, and becomes sulphurous acid by uniting with the oxygen of the air. In the mean time, that portion of the antimony which loses its sulphur becomes oxidized; so that the roasted matter consists of undecomposed sulphuret and sesquioxide of antimony; and these, by uniting during the fusion, form the glass.

Properties. Glass of antimony is generally in thin irregular pieces, exhibiting a vitreous fracture, and having a metallic steel-gray lustre. When well prepared, it is transparent, and upon being held between the eye and the light, appears of a rich orange-red or garnet colour. It is hard and brittle, and rings when struck with a hard substance. It is insoluble in water, but soluble in acids and in cream of tartar, with the exception of a few red flocculi to be mentioned presently.

Composition, &c. The essential constituents of glass of antimony are the sesquioxide and sulphuret united in variable proportions. When of good quality, it contains about eight parts of sesquioxide to one of sulphuret. According to Berzelius, the basis of the preparation is a definite compound of one equivalent of sesquioxide, and two equiv. of sesquisulphuret of antimony, corresponding with the pure crocus of antimony; while the glass itself is a mixture of this with the sesquioxide in excess when it is transparent and of good quality, and with the sesquisulphuret in excess, when it is black and opaque, and therefore inferior. The flocculi, alluded to in the preceding paragraph, consist of this definite compound, which corresponds also with the native red antimony of mineralogists.

Glass of antimony, as usually prepared, contains about five per cent. of silica, and three of peroxide of iron. These impurities are almost invariably present. When good, it is dissolved, with the exception of the red flocculi already referred to, by strong muriatic acid. An excess of silica is known by the acid leaving a gelatinous residuum; and iron may be detected by ferrocyanate of potassa, and its amount judged of by the bulk of the precipitate, or the depth of its colour. Sometimes glass of lead is sold for glass of antimony; a fraud easily detected by the difference in sp. gr. between the two substances; the glass of lead weighing nearly 7, while the density of the glass of antimony is not quite 5. It may also be discovered by boiling the suspected article with cream of tartar; when, if it be glass of lead, it will turn black, without generating tartar emetic.

Medical Properties and Pharm. Uses. Glass of antimony is an active antimonial, formerly much employed; but at the present day, owing to its variable composition and uncertain operation, is entirely laid aside. When the levigated powder is mixed with one-eighth of its weight of melted yellow wax, and the mixture is roasted over a slow fire, with constant stirring, until it ceases to exhale vapours, a coal-like, pulverizable mass is formed, which is the *Cerated Glass of Antimony*, a preparation formerly included in the Edinburgh Pharmacopœia, but long since very properly expunged from that work. The Glass of antimony is introduced into the London Pharmacopœia, to be employed in the process of that College for the preparation of tartar emetic. (See *Antimonium Tartarizatum*, Lond.) B.

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APOCYNUM ANDROSÆMIFOLIUM. *U.S. Secondary.*

Dog's-bane.

"Apocynum androsæmifolium. Radix. *The root.*" *U. S.*

APOCYNUM. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Apocyneæ.

Gen. Ch. *Calyx* very small, five-cleft, persistent. *Corolla* campanulate, half five-cleft, lobes revolute, furnished at the base with five dentoid glands alternating with the stamens. *Anthers*, connivent, sagittate, cohering to the stigma by the middle. *Style* obsolete. *Stigma* thick and acute. *Follicles* long and linear. *Seed* comose. *Nuttall.*

Apocynum androsæmifolium. Willd. *Sp. Plant.* i. 1259; Bigelow, *Am. Med. Bot.* ii. 148. The Dog's-bane is an indigenous, perennial, herbaceous plant, from three to six feet in height, and abounding in a milky juice, which exudes when any part of the plant is wounded. The stem is erect, smooth, simple below, branched above, usually red on the side exposed to the sun, and covered with a tough fibrous bark. The leaves are opposite, petiolate, ovate, acute, entire, smooth on both sides, and two or three inches long. The flowers are white, tinged with red, and grow in loose, nodding, terminal or axillary cymes. The peduncles are furnished with very small acute bractes. The tube of the corolla is longer than the calyx, and its border spreading. The fruit consists of a pair of long, linear, acute follicles, containing numerous imbricated seeds, attached to a central receptacle, and each furnished with a long seed-down.

The plant flourishes in all parts of the United States, from Canada to Carolina. It is found along fences and the skirts of woods, and flowers in June and July. The root is the part employed.

This is large, and like other parts of the plant contains a milky juice.

Its taste is unpleasant and intensely bitter. Bigelow inferred from his experiments that it contained bitter extractive, a red colouring matter soluble in water and not in alcohol, caoutchouc, and volatile oil.

Medical Properties. The powder of the recently dried root acts as an emetic in the dose of thirty grains; and is said to be sometimes employed by practitioners in the country for this purpose. By Dr. Zollickoffer it is considered a useful tonic, in doses of from ten to twenty grains. Dr. Bigelow states that its activity is diminished, and eventually destroyed by keeping. It is among the remedies employed by the Indians in lues venerea. W.

APOCYNUM CANNABINUM. *U.S. Secondary.*

Indian Hemp.

"Apocynum cannabinum. Radix. *The root.*" *U.S.*

Apocynum. See APOCYNUM ANDROSÆMIFOLIUM.

Apocynum cannabinum. Willd. *Sp. Plant.* i. 1259; Knapp, *Am. Med. Rev.* iii. 197. In general appearance and character, this species bears a close resemblance to the preceding. The stems are herbaceous, erect, branching, of a brown colour, and two or three feet in height; the leaves are opposite, oblong-ovate, acute at both ends, and somewhat downy beneath; the cymes are paniculate, many-flowered, and pubescent; the corolla small and greenish, with a tube not longer than the calyx, and with an erect border; the internal parts of the flower pinkish or purple. The plant grows in similar situations with the *A. androsæmifolium*, and flowers about the same period. Like that species, it abounds in a milky juice, and has a tough fibrous bark, which, by maceration, affords a substitute for hemp. From this circumstance the common name of the plant was derived. The root is the part designated by the United States Pharmacopœia, in the last edition of which this species was first recognised as officinal.

It is horizontal, five or six feet in length, about one-third of an inch thick, dividing near the end into branches which terminate abruptly, of a yellowish-brown colour when young, but dark chestnut when old, of a strong odour, and a nauseous, somewhat acrid, permanently bitter taste. The internal or ligneous portion is yellowish-white, and less bitter than the exterior or cortical part. The fresh root, when wounded, emits a milky juice, which concretes into a substance closely resembling caoutchouc. In the dried state, it is brittle and readily pulverized, affording a powder like that of ipecacuanha. According to Dr. Knapp* it contains a bitter principle, extractive, tannin, gallic acid, resin, wax, caoutchouc, fecula, lignin, and a peculiar principle upon which its activity depends, and which he proposes to call *apocynin.* Dr. Griscom by a recent analysis has obtained similar results, with the addition of gum to the other ingredients. The root yields its virtues to water and alcohol, but according to Dr. Griscom, most readily to the former.

Medical Properties and Uses. Indian hemp is powerfully emetic and cathartic, sometimes diuretic, and like other emetic substances, promotes diaphoresis and expectoration. It produces much nausea, diminishes the frequency of the pulse, and appears to induce drowsiness independently of the exhaustion consequent upon vomiting. The disease in which it has been found most beneficial is dropsy. An aggravated case of ascites, under the care of Dr. Joseph Parrish of Philadelphia, was completely cured by the decoction of the plant, which acted as a powerful hydragogue cathartic. Dr. Knapp also found it useful in a case of dropsy. Other instances of its efficacy in this complaint have been recently published by Dr. Griscom of New York. (*Am. Journ. of Med. Sciences*, xii. 55.)

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* See an Inaugural Dissertation by M. L. Knapp, M. D., in the Am. Med. Review, Philadelphia, 1826. Vol. iii. p. 197.

From fifteen to thirty grains of the powdered root will generally produce copious vomiting and purging. The decoction is a more convenient form of administration. It may be prepared by boiling half an ounce of the dried root in a pint and a half of water to a pint, of which from one to two fluidounces may be given two or three times a day, or more frequently if requisite. The watery extract, in doses of three or four grains three times a day, will generally act on the bowels. W.

AQUA. *U.S.*

Water.

ὕδωρ, *Gr.;* Eau, *Fr.;* Wasser, *Germ.;* Acqua, *Ital.*, Agua, *Span.*

Water stands very properly in the United States Pharmacopœia, as an article of the materia medica, on account of its great importance as a medical and pharmaceutical agent. In the British Pharmacopœias it has been unaccountably omitted from the list of the materia medica, although it is constantly employed in the preparations. It is one of the most abundant productions in nature, and plays an important part in the economy of the universe. It is more or less concerned in almost all the changes which take place in inorganic matter, and is essential to the growth and existence of living beings, whether animal or vegetable. In treating of a substance of such diversified agency, our limits will only allow of a sketch of its properties and modifications. We shall speak of it under the several heads of *pure water*, *common water*, and *mineral waters*.

PROPERTIES OF PURE WATER. Water, in a pure state, is a transparent liquid, without colour, taste, or smell. Its sp. gr. is assumed to be unity by common consent, and forms the term of comparison for that of all solids and liquids. A cubic inch of it, at the temp. of 60°, weighs very nearly 252.5 grains. It is compressible to a small extent, as was first proved by Canton, and afterwards, in an incontestible manner, by Perkins. Reduced in temp. to 32°, it becomes a solid or ice; and raised to that of 212°, an elastic fluid called steam. In the state of steam its bulk is increased nearly 1700 fold, and its sp. gr. so far diminished as not to be much more than half as great as that of atmospheric air. At the temp. of 39° its density is at the maximum; and consequently, setting out from this point, it is increased in bulk by being either heated or cooled. It has the power of dissolving more or less of all the gases, and, among the rest, of common air, the constituents of which are always present in natural water. It is uniformly present in the atmosphere, in the form of an invisible vapour, even in the driest weather, and exerts, by its variable amount at different times, an important influence on the animal economy.

Water unites with other bodies either in the liquid or solid form; in the former case producing solutions, in the latter hydrates. It is the most universal solvent known, and on this property mainly depends its great influence in the operations of nature.

Water consists of one equivalent of hydrogen 1, and one of oxygen 8 = 9; or in volumes, of one volume of hydrogen, and half a volume of oxygen, condensed into one volume of aqueous vapour or steam. On these data, it is easy to calculate the sp. gr. of steam, for its density will be .0689 (sp. gr. of hydrogen) + .5512 (half the sp. gr. of oxygen) = .6201.

COMMON WATER. From the extensive solvent powers of water, it may be readily inferred, that, in its natural state, it must be more or less contaminated with foreign matter. This is found to be the case; and, according to the nature of the strata through which it percolates, it becomes variously impregnated. When the foreign substances present are in so small amount, as not very materially to alter its taste and other sensible qualities, it constitutes the different varieties of *common water*.

Common water possesses almost innumerable shades of difference, as obtained from different localities and sources; but all its varieties may be conveniently arranged under the two heads of soft and hard. A *soft water* is one which contains but inconsiderable impurities, and which, when used in washing, does not curdle soap. By a *hard water* is understood a variety of water which contains sulphate of lime, and, therefore, curdles soap, and is unfit for domestic purposes. Tincture of soap is a convenient and useful test for ascertaining the quality of water. In distilled water it produces no effect; in soft water, only a slight opalescence; and in a hard water, a milky appearance. This latter appearance is due to the formation of an insoluble compound between the oil of the soap and the lime of the sulphate of lime.

The most usual foreign substances in common water, besides oxygen and nitrogen, and matters held in a state of mechanical suspension, are carbonic acid, sulphate and carbonate of lime, and chloride of sodium (common salt). Carbonic acid is detected by lime-water, which produces a precipitate before the water is boiled, but not afterwards, as ebullition drives off this acid. The presence of sulphate of lime is shown by precipitates being produced by nitrate of baryta, and after ebullition, by oxalate of ammonia. The first test shows the presence of sulphuric acid, and the latter, of lime not held in solution by carbonic acid. Carbonate of lime can be present only by being held in solution by an excess of carbonic acid, and is detected by boiling the water, which causes it to precipitate. Nitrate of silver will produce a precipitate, if any chloride or muriate be present; and in all ordinary cases the particular one present may be assumed to be common salt.

It is generally supposed that the oxygen and nitrogen present in natural waters are in the same proportion as in atmospheric air; but for the most part the oxygen is in excess. In atmospheric air, the oxygen amounts to 20 per cent. in volume; but the usual gaseous mixture expelled from fresh water by boiling contains about 32 per cent. of this gas. The cause of this difference in proportion, is, that water has a greater affinity for oxygen than nitrogen, and consequently takes up proportionably more of the former from the atmosphere.

Common water is also divided into varieties according to its source. Thus we have *Rain*, *Snow*, *Spring*, *River*, *Well*, *Lake*, and *Marsh Water*. This division is not so practical, however, as that into *soft* and *hard;* as the source of the water is not always indicative of its quality. We shall notice these varieties in a general manner.

Rain and Snow Waters are the purest kinds of natural water, being, in effect, produced by a kind of natural distillation. Rain water, to be obtained as pure as possible, must be collected in large vessels in the open fields at a distance from houses, and some time after the rain has commenced falling, otherwise it will be contaminated with the dust which floats in the atmosphere, and other impurities derived from roofs. It may be obtained tolerably pure, even in large cities, by taking advantage of a heavy rain, and, after it has descended for a considerable time and washed away every impurity, collecting it as it falls from the roofs and spouts.

Rain water ordinarily contains atmospheric air; and, according to Liebig, a little nitric acid, if it descended during a storm. It is said to contain also a trace of chloride of calcium; but this is highly improbable, on account of the fixed nature of this salt. Snow water has a peculiar taste, which was formerly supposed to depend on the presence of air more oxygenous than that of the atmosphere; but in point of fact, when newly melted it contains no air, and this accounts for its vapid taste. After exposure to the air, however, for some time, it takes up the constituent gases of the atmosphere like other natural waters. Both rain and snow water are sufficiently pure for employment in most chemical operations.

Spring Water (aqua fontana) depends entirely for its quality on the strata through which it flows, being purest when it passes through sand or gravel. It almost always contains a trace of common salt, and generally other impurities, which vary according to the locality of the spring.

River Water (aqua fluviatilis), generally speaking, is less impregnated with saline matter than spring water; on account of its being made up in considerable part of rains, and of its volume bearing so large a proportion to the surface of its bed. On the other hand, it is much more apt to have mechanically suspended in it, certain insoluble matters of a vegetable and earthy nature, which impair its transparency.

Well Water, like that from springs, is liable to contain various impurities. As a general rule, the purity of the water of a well will be in proportion to its depth, and the constancy with which it is used. The Artesian or overflowing wells, on account of their great depth, generally afford a very pure water.

Lake Water cannot be characterized as having any invariable qualities. In most of the lakes in the United States it constitutes a very pure and wholesome water. This remark is particularly applicable to our great lakes.

Marsh Water is generally stagnant, and contains vegetable remains undergoing decomposition. It is an unwholesome variety of water, and ought never to be used for medicinal purposes.

The term *Aqua*, in the U.S. Pharmacopœia, may be considered as designating any natural water of good average quality. A good water may be known by its being lively, limpid, and without smell. It answers well for the cooking of vegetables, and does not curdle soap. Upon the addition of nitrate of baryta, nitrate of silver, or oxalate of ammonia, its transparency is but slightly affected; and upon being evaporated to dryness, it leaves but an inconsiderable residue.

Water should never be kept in leaden cisterns, on account of the risk of its dissolving a small portion of lead. This risk is greater in proportion to the original purity of the water; for it is found, that the presence of a minute portion of saline matter, as for example of a muriate or sulphate, protects the water from the slightest metallic impregnation. The protection is afforded by the formation of an insoluble film on the surface of the lead, as a consequence of the decomposition of the saline matter. (See *Christison on Poisons.*)

The Schuylkill water introduced into the City of Philadelphia possesses all the characteristics of a good water, except that it is occasionally turbid after heavy rains. Accordingly, it may be used pharmaceutically in all cases in which "water" is directed as contradistinguished from "distilled water." A brackish or hard water ought never to be employed. For some pharmaceutical processes, however, no natural water is deemed sufficiently pure; and hence the necessity of resorting to a process for its purification. This is effected by distillation, and accordingly all the Pharmacopœias give a formula for distilled water. (See *Aqua Destillata.*)

MINERAL WATERS. Natural waters, when they are so far impregnated with foreign substances as to have a decided taste and a peculiar operation on the animal economy, are called *Mineral Waters.* These are necessarily very diversified in their nature, but they are conveniently arranged for description under the four heads of *carbonated*, *sulphuretted*, *chalybeate*, and *saline.*

1. *Carbonated waters* are characterized by containing an excess of carbonic acid, which gives them a sparkling appearance, and the power of reddening litmus paper. These waters frequently contain the carbonates of lime, magnesia, and iron, which are held in solution by the excess of carbonic acid. The waters of Seltzer, Spa, and Pyrmont in Europe, and of the sweet springs in Virginia, belong to this class.

2. *Sulphuretted waters* are such as contain sulphuretted hydrogen, and are distinguished by the peculiar fetid smell of that gas, and by their yielding a brown precipitate with the salts of lead or silver. Examples of this kind of mineral water are furnished by the waters of Aix la Chapelle and Harrowgate in Europe, and those of the white, red, and salt sulphur springs in Virginia.

3. *Chalybeate waters* are characterized by a strong inky taste, and by striking a black colour with the infusion of galls, and a blue one with ferrocyanate of potassa. The iron is generally in the state of protocarbonate held in solution by excess of carbonic acid. By standing, the carbonic acid is given off, and the protoxide becomes a hydrated peroxide of an ochreous colour, and is precipitated. The principal chalybeate waters are those of Tunbridge and Brighton, in England, and Balston Spa, Bedford, Pittsburgh, and Brandywine, in the United States.

4. *Saline waters* are those, the prominent properties of which depend upon saline impregnation. The salts most usually present are the sulphates, muriates, and carbonates of lime, magnesia, and soda. Potassa is occasionally present, and lithia has been detected by Berzelius in the spring of Carlsbad, in Germany. Bromine exists in considerable quantity in the saline at Theodorshalle, in Germany, and iodine is not unfrequently present. The water of the Congress spring at Saratoga, in the state of New York, contains, according to Dr. Steel, both iodine and bromine in small quantity. The principal saline waters are those of Seidlitz in Bohemia, Cheltenham and Bath in England, and Harrodsburg and Saratoga in the United States. To these may be added, a most important saline water, that of the ocean.

We subjoin a summary view of the composition of most of the mineral waters enumerated under the foregoing heads, with the authority for each analysis.

CARBONATED. *Seltzer.* In a wine pint. Carbonic acid 17 cubic inches. *Solid contents;*—carbonate of soda 4 grs.; carbonate of magnesia 5; carbonate of lime 3; chloride of sodium 17. Total 29 grs. *Bergmann.*

Spa. In a wine pint. Carbonic acid 13 cubic inches. *Solid contents;*—carbonate of soda 1.5 grs.; carbonate of magnesia 4.5; carbonate of lime

1.5; chloride of sodium 0.2; oxide of iron 0.6. Total 8.3 grs. *Bergmann.*

Pyrmont. In a wine pint. Carbonic acid 26 cubic inches. *Solid contents;*—carbonate of magnesia 10 grs.; carbonate of lime 4.5; sulphate of magnesia 5.5; sulphate of lime 8.5; chloride of sodium 1.5; oxide of iron 0.6. Total 30.6 grs. *Bergmann.*

SULPHURETTED. *Aix la Chapelle.* In a wine pint. Sulphuretted hydrogen 5.5 cubic inches. *Solid contents;*—carbonate of soda 12 grs.; carbonate of lime 4.75; chloride of sodium 5. Total 21.75 grs. *Bergmann.*

Harrowgate old well. In a wine gallon. *Gaseous contents;*—sulphuretted hydrogen 14 cubic inches; carbonic acid 4.25; nitrogen 8; carburetted hydrogen 4.15. Total 30.4 cubic inches. *Solid contents;*—chloride of sodium 752 grs.; muriate of lime 65.75; muriate of magnesia 29.2; bicarbonate of soda 12.8. Total 859.75 grs. *English West. Quart. Journ.*

White Sulphur. In a wine gallon. *Gaseous contents;*—sulphuretted hydrogen 2.5 cubic inches; carbonic acid 2; oxygen 1.448; nitrogen 3.552. Total 9.5 *Solid contents in a pint;*—sulphate of magnesia 5.588 grs.; sulphate of lime 7.744; carbonate of lime 1.150; muriate of lime 0.204; chloride of sodium 0.180; oxide of iron a trace; loss 0.410. Total 15.276 grs. *Prof. William B. Rogers.*

CHALYBEATE. *Tunbridge.* In a wine gallon. *Solid contents;*—chloride of sodium 2.46 grs.; muriate of lime 0.39; muriate of magnesia 0.29; sulphate of lime 1.41; carbonate of lime 0.27; oxide of iron 2.22; traces of manganese, vegetable fibre, silica, &c. 0.44; loss 0.13. Total 7.61 grs. *Scudamore.*

Brighton. In a wine pint. Carbonic acid 2.5 cubic inches. *Solid contents;*—sulphate of iron 1.80 grs.; sulphate of lime 4.09; muriate of soda 1.53; muriate of magnesia 0.75; silica 0.14; loss 0.19. Total 8.5 grs. *Marcet.*

Cheltenham, (*chalybeate.*) In a wine pint. *Gaseous contents;*—carbonic acid 2.5 cubic inches. *Solid contents;*—carbonate of soda 0.5 grs.; sulphate of soda 22.7; sulphate of magnesia 6; sulphate of lime 2.5; chloride of sodium 41.3; oxide of iron 0.8. Total 73.8 grs. *Brande and Parkes.*

Balston Spa. Sans Souci Spring. In a wine gallon. *Solid contents;*—chloride of sodium 143.733 grs.; bicarbonate of soda 12.66; bicarbonate of magnesia 39.1; carbonate of lime 43.407; carbonate of iron 5.95; hydriodate of soda 1.3; silica 1. Total 247.15 grs. *Steel.*

Bedford. Anderson's Spring. In a wine gallon. Carbonic acid 74 cubic inches. *Solid contents;*—sulphate of magnesia 80 grs.; sulphate of lime 14.5; chloride of sodium 10; muriate of lime 3; carbonate of iron 5; carbonate of lime 8. Total 120.5 grs. *Church.*

SALINE. *Seidlitz.* In a wine pint. *Solid contents;*—carbonate of magnesia 2.5 grs.; carbonate of lime 0.8; sulphate of magnesia 180; sulphate of lime 5; muriate of magnesia 4.5. Total 192.8 grs. *Bergmann.*

Cheltenham, (*pure saline.*) In a wine pint. *Solid contents;*—sulphate of soda 15 grs.; sulphate of magnesia 11; sulphate of lime 4.5; chloride of sodium 50. Total 80.5 grs. *Parkes and Brande.*

Bath. In a wine pint. Carbonic acid 1.2 cubic inches. *Solid contents;*—carbonate of lime 0.8 grs.; sulphate of soda 1.4; sulphate of lime 9.3, chloride of sodium 3.4; silica 0.2; oxide of iron a trace. Total 15.1 grs. *Phillips.*

Saratoga. Congress Spring. In a wine gallon. *Gaseous contents;*—carbonic acid 311 cubic inches; atmospheric air 7. Total 318 cubic inches. *Solid contents;*—chloride of sodium 385 grs.; hydriodate of soda 3.5; bicarbonate of soda 8.982; bicarbonate of magnesia 95.788; carbonate of lime 98.098; carbonate of iron 5.075; silica 1.5; hydrobromate of potassa a trace. Total 597.943 grs. *Steel.**

Sea Water. In a wine pint. Chloride of sodium 180.5 grs.; muriate of magnesia 18.3; muriate of lime 5.7; sulphate of magnesia 21.6. Total 226.1 grs. *Murray.*

Medical and Dietetic Properties of Water.—Water is a substance of the first necessity to living beings, whether vegetable or animal. In animals there exists an instinctive desire for it, to repair the waste of the fluids which is constantly taking place in the animal economy. It constitutes the basis of nearly all the secretions, and nine-tenths of the weight of the blood. In short, it is nature's agent for producing the liquid state; and it is the only diluent proper in a state of health.

Water as a remedy is highly important, though we are apt to overlook its agency, on account of our familiarity with its use. When taken into the stomach, it acts by its temperature, by its bulk, and by being absorbed. When of the temperature of about 60°, it gives no positive sensation either of heat or cold; between 60° and 45°, it creates a cool sensation; and below 45°, a decidedly cold one. Between 60° and 100°, it relaxes the fibres of the stomach, and is apt to produce nausea, particularly if the effect of bulk be added to that of temperature. By its bulk and solvent powers, it often allays irritation by diluting the acrid contents of the stomach and bowels, and favouring their final expulsion; and by its absorption, it promotes the secretion of urine and cutaneous transpiration. Indeed, its influence is so great in the latter way, that it may be safely affirmed, that sudorifics and diuretics will not produce their proper effect unless assisted by copious dilution.

Water, externally applied as a bath, is also an important remedy. It may act by its own specific effects as a liquid, or as a means of modifying the heat of the body. It acts in the latter way differently, according to the particular temperature at which it may be applied. When this is above 97°, it constitutes either the vapour or hot bath; when between 97° and 85°, the warm bath; between 85° and 65°, the tepid bath; and between 65° and 32°, the cold bath.

The general action of the vapour bath is to accelerate the circulation, and produce profuse sweating. It acts locally on the skin by softening and relaxing its texture. In stiffness of the joints, and various diseases of the skin, it has often proved beneficial. The late Dr. Duncan stated that he had seen scaly cutaneous diseases, which had resisted for years every other treatment, become quickly cured by its use.

The hot, like the vapour bath, is decidedly stimulant. By its use, the pulse becomes full and frequent, the veins turgid, the face flushed, the skin red, and the respiration quickened. If the temperature be high, and the constitution peculiar, its use is not without danger; as it is apt to produce a feeling of suffocation, violent throbbing in the temples, and vertigo, with tendency to apoplexy. When it acts favourably, it depletes actively from the skin by producing profuse sweating.

The warm bath, though below the animal heat, nevertheless produces a sensation of warmth, as its temperature is above that of the surface. It diminishes the frequency of the pulse, especially if previously accelerated, renders the respiration slower, lessens the heat of the body, and relaxes the skin. The warm bath cannot be deemed, strictly speaking, a stimulant; but by relieving certain diseased actions and states, accompanied by morbid irritability, it forms an excellent soothing remedy, producing a disposition to sleep. It is proper, in febrile and exanthematous diseases, in which the pulse is frequent, and the skin preternaturally hot and dry, and where the general condition is characterized by restlessness. It is contra-indicated in diseases of the head and chest.

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* We have taken our notices of the mineral waters of the United States from a valuable work on Baths and Mineral Waters, by Dr. John Bell, and from the interesting treatise on the Mineral Waters of Saratoga and Balston, by Dr. John H. Steel; both published in 1831.

The tepid bath, from its temperature, is not calculated to have much modifying influence on the heat of the body. Its peculiar effects are to soften and cleanse the skin, and promote insensible perspiration.

The cold bath acts differently according to its temperature and manner of application, and the condition of the system to which it is applied. When of low temperature and suddenly applied, it acts primarily as a stimulant, by the sudden and quick manner in which the caloric is abstracted, or made to pass through the substance of the body; next, as a tonic, by removing the opponent to attraction which tends to condense the living fibre; and finally, as a sedative. If it were applied at a temperature just sufficient to excite a cool sensation, and this temperature gradually and imperceptibly lowered, it is probable that the cold bath would act exclusively as a sedative.

From the above explanations, it may be easily understood that the cold bath will act very differently under different circumstances. It is often useful in diseases of relaxation and debility, when practised by affusion or plunging. But it is essential to its efficacy and safety in these cases, that the stock of vitality should be sufficient to create, immediately after its use, those general sensations of warmth and invigoration included under the term reaction. It has also been used with advantage by the late Dr. Currie of Liverpool, in the form of affusion, in certain febrile diseases, especially scarlatina. To make it safe in these diseases, however, the heat must be steadily above the natural standard; and the patient must be free from all sense of chilliness, and not in a state of profuse perspiration.

Cold water is frequently applied as a sedative in local inflammations, and as a means of restraining hemorrhage. It is, however, inadmissible in inflammations of the chest.

Pharm. Uses. Water is the most extensive pharmaceutical agent which we possess. It is employed in a vast number of preparations, as a means of promoting chemical action by its solvent powers. It is more or less present in all the liquid forms of medicines, and is the sole menstruum in the medicated waters, decoctions, and infusions.

Off. Prep. Aqua Destillata, *U.S.*, *Lond.*, *Ed.*, *Dub.* B.

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ARALIA NUDICAULIS. *U.S. Secondary.*

False Sarsaparilla.

"Aralia nudicaulis. Radix. *The Root.*" *U.S.*

Aralia. *Sex. Syst.* Pentandria Pentagynia.—*Nat. Ord.* Araliaceæ.

Gen. Ch. *Flowers* umbelled. *Calyx* five-toothed, superior. *Petals* five. *Stigma* sessile, subglobose. *Berry* five-celled, five-seeded. *Torrey.*

Aralia nudicaulis. Willd. *Sp. Plant.* i. 1521; Rafinesque, *Med. Flor.* i.

53. The *false sarsaparilla, wild sarsaparilla,* or *small spikenard,* as this plant is variously called, is an indigenous perennial, with one leaf and one flower-stem springing together from the root or from a very short stalk, and seldom rising two feet in height. The leaf, which stands upon a long footstalk, is twice ternate, or once and quinate, with oblong-oval, acuminate leaflets, rounded at the base, serrate on the margin, and smooth on both surfaces. The scape or flower-stem is naked, shorter than the leaf, and terminated by three small umbels, each consisting of from twelve to thirty small yellowish or greenish flowers. The fruit consists of small round berries, about as large as those of the common elder.

The plant grows throughout the United States, from Canada to Carolina, inhabiting shady and rocky woods, and delighting in a rich soil. It flowers in May and June. The root is the officinal portion.

This is horizontal, creeping, sometimes several feet in length, about as thick as the little finger, more or less twisted, externally of a yellowish-brown colour, of a fragrant odour, and a warm, aromatic, sweetish taste. It has not been analyzed.

Medical Properties and Uses. False sarsaparilla is a gentle stimulant and diaphoretic; and is thought to exert an alterative influence over the system analogous to that of the root from which it derived its name. It is used in domestic practice, and by some practitioners in the country, as a remedy in rheumatic, syphilitic, and cutaneous affections, in the same manner and dose as the genuine sarsaparilla.

The root of the *Aralia racemosa* or *American spikenard,* though not officinal, is used for the same purposes as the A. nudicaulis, which it is said to resemble in medical properties. W.

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ARALIA SPINOSA. *U.S. Secondary.*

Angelica-tree Bark.

"Aralia spinosa. Cortex. *The Bark.*" *U.S.*

Aralia. See ARALIA NUDICAULIS.

Aralia spinosa. Willd. *Sp. Plant.* i. 1520. This is an indigenous arborescent shrub, variously called *angelica-tree, toothach tree,* and *prickly ash.* The last name, however, should be dropped, as it belongs properly to the *Xanthoxylum fraxineum,* and if retained might lead to confusion. The stem is erect, simple, from eight to twelve feet high, armed with numerous prickles, and furnished near the top with very large bipinnate or tripinnate leaves, which are also prickly, and are composed of oval, pointed, slightly serrate leaflets. It terminates in an ample panicle, very much branched, and bearing numerous small hemispherical umbels, in each of which are about thirty white flowers.

This species of Aralia is found chiefly in the Southern and Western States, though cultivated in the gardens of the North as an ornamental plant. It flourishes in low, fertile woods, and flowers in August and September. The bark, root, and berries are medicinal; but the first only is directed by the Pharmacopœia.

The bark is thin, grayish externally, yellowish within, of an odour somewhat aromatic, and a bitterish, pungent, acrid taste. It yields its virtues to boiling water.

Medical Properties and Uses. The virtues of *Aralia Spinosa* are those of a stimulant diaphoretic. According to Elliot, an infusion of the recent bark of the root is emetic and cathartic. The remedy is used in chronic rheumatism and cutaneous eruptions. Pursh states, that a vinous or spirituous infusion of the berries is remarkable for relieving rheumatic pains; and a similar tincture is said to be employed in Virginia with advantage in violent colic. The pungency of this tincture has also been found useful in relieving toothach.

The bark is most conveniently administered in decoction. W.

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ARCTIUM LAPPA. Semina. Radix. *Dub.*

Seeds and Root of Burdock.

Off. Syn. ARCTII LAPPÆ SEMINA. ARCTII LAPPÆ RADIX. *Ed.*

Bardane, *Fr.;* Gemeine Klette, *Germ.;* Bardana, *Ital., Span.*

Arctium. *Sex. Syst.* Syngenesia Æqualis.—*Nat. Ord.* Compositæ Cinarocephalæ.

Gen. Ch. Receptacle chaffy. *Calyx* globular; the scales at the apex with inverted hooks. *Seed-down* bristly, chaffy. *Willd.*

Arctium Lappa. Willd. *Sp. Plant.* iii. 1631; Woodv. *Med. Bot.* p. 32, t. 13. The *burdock* is a biennial plant, with a simple spindleshaped root, a foot or more in length, brown externally, white and spongy within, furnished with threadlike fibres, and having withered scales near the summit. The stem is succulent, pubescent, branching, and three or four feet in height, bearing very large cordate, denticulate leaves, which are green on their upper surface, whitish and downy on the under, and stand on long footstalks. The flowers are purple, globose, and arranged in terminal panicles. The calyx consists of imbricated scales, with hooked extremities, by which they adhere to clothes, and to the coats of animals. The seed-down is rough and prickly, and the seeds quadrangular.

This plant is a native of Europe, and is abundant in this country, where it grows on the road sides, among rubbish, and in cultivated grounds. Pursh thinks that it was introduced. The root, which should be collected in spring, loses four-fifths of its weight by drying.

The odour of the root is weak and unpleasant, the taste mucilaginous and sweetish, with a slight degree of bitterness and astringency. Among its constituents, inulin has been found by Guibourt, and sugar by Fée.

The seeds are aromatic, bitterish, and somewhat acrid.

Medical Properties and Uses. The root is considered aperient, diaphoretic, and sudorific, without irritating properties; and has been recommended in gouty, scorbutic, venereal, rheumatic, scrofulous, leprous, and nephritic affections. To prove effectual, its use must be persevered in for a long time. It is best administered in the form of decoction, which may be prepared by boiling two ounces of the recent bruised root in three pints of water to two, and given in the quantity of a pint during the day. The seeds are diuretic, and have been used in the same complaints in the form of emulsion or powder. The dose is a drachm. The leaves have also been employed both externally and internally in cutaneous eruptions and ulcerations.

W.

ARGENTUM. *U.S., Lond., Ed., Dub.*

Silver.

Argent, *Fr.;* Silber, *Germ.;* Argento, *Ital.;* Plata, *Span.*

Silver is occasionally found in the metallic state, sometimes pure and crystallized, or in the form of vegetations, at other times combined with gold, antimony, arsenic, or mercury; but more usually it occurs in the state of sulphuret, either pure, or mixed with other sulphurets, such as those of copper, lead, and antimony. It is sometimes, though rarely, found as a chloride.

The most productive mines of silver are found on this continent, being those of Mexico and Peru; the richest in Europe are situated at Kongsberg in Norway, in Hungary, and in Transylvania. The principal ore which is worked is the sulphuret. The mineral containing silver which is most disseminated is the argentiferous galena, which is a sulphuret of lead, associated with a sulphuret of silver. No mines of silver have been found in the United States; but argentiferous galena exists in several localities. That from the mine of Ephraim Lane, seventeen miles west of New-Haven, is exceedingly rich, yielding two hundred and seventy-two ounces of silver to the ton of reduced lead. The annual product of all the silver mines in Europe and America is estimated at about eight hundred and fifty tons, of which only a twelfth or fifteenth part is furnished by Europe.

Extraction. Silver is extracted from its ores by two principal processes, *amalgamation* and *cupellation.* At Freyberg in Saxony, the ore, which is principally the sulphuret, is worked in the following manner. It is mixed with a tenth of chloride of sodium (common salt), and roasted in a reverberatory furnace: the sulphur becomes acidified, and combines with the soda, resulting from the oxidizement of the sodium, to form sulphate of soda, while the chlorine forms a chloride with the silver. The roasted mass is then reduced to very fine powder, mixed with half its weight of mercury, one-third of its weight of water, and about a seventeenth of iron in flat pieces, and subjected, for sixteen or eighteen hours, to constant agitation in barrels turned by machinery. The chlorine combines with the iron, and remains in solution as chloride of iron, while the silver forms an amalgam with the mercury. The amalgam is then subjected to pressure in leathern bags, through the pores of which the excess of mercury passes, while a solid amalgam remains behind. This is then subjected to heat in a distillatory apparatus, by means of which the mercury is separated from the pure silver, which remains behind in the form of a porous mass. In Peru and Mexico the process is somewhat similar to the above, common salt and mercury being used; but slaked lime and sulphuret of iron are also employed, with an effect which is not very obvious.

When argentiferous galenas are worked for the silver they contain, they are first reduced, and the metal obtained is subjected to the combined action of heat and a current of air on a very large and shallow cupel, called a *test,* made of spent ashes or pulverized bones. The metal undergoes fusion, and the lead becoming oxidized and vitrified, is either scraped or blown off the the test; while the silver, not being oxidizable, remains behind.

Properties. Silver is a white metal, very brilliant, malleable, and ductile. In malleability and ductility, it is inferior only to gold. It is harder than gold, but softer than copper. Its tenacity is very great, and its sp. gr. about

10.5. Exposed to a full red heat, it enters into fusion, and exhibits a brilliant appearance. It is not oxidized in the air, but contracts a superficial tarnish, in consequence of combining with sulphur. It forms but one well characterized oxide, which is of an olive colour, consisting of one equivalent of silver 108, and one equiv. of oxygen 8 = 116.

Pharm. Uses. Silver has no action on the animal economy; and is introduced into the Pharmacopœia solely for the purpose of forming nitrate of silver, the only officinal preparation of this metal.

Off. Prep. Argenti Nitras, *U.S., Lond., Ed., Dub.;* Argenti Nitratis Crystalli, *Dub.* B.

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ARMORACIA. *U.S.*

Horse-radish.

"Cochlearia armoracia. Radix recens. *The fresh root.*" *U.S.*

Off. Syn. ARMORACIÆ RADIX. Cochlearia Armoracia. Radix. *Lond.;* COCHLEARIÆ ARMORACIÆ RADIX. *Ed.;* COCHLEARIA ARMORACIA. Radix. *Dub.*

Raifort sauvage, *Fr.;* Meerrettig, *Germ.;* Rafano rusticano, *Ital.,;* Rabano rusticano, *Span.*

Cochlearia. *Sex. Syst.* Tetradynamia Siliculosa.—*Nat. Ord.* Cruciferæ.

Gen. Ch. *Silicula* emarginate, turgid, scabrous, with gibbous, obtuse valves. *Willd.*

Cochlearia Armoracia. Willd. *Sp. Plant.* iii. 451; Woodv. *Med. Bot.* p. 400. t. 145. The root of this plant is perennial, sending up numerous very large leaves, from the midst of which a round, smooth, erect, branching stem rises, two or three feet in height. The radical leaves are lance-shaped, waved, scollopped on the edges, sometimes pinnatifid, and stand upon strong footstalks. Those of the stem are much smaller, without footstalks, sometimes divided at the edges, sometimes almost entire. The flowers are numerous, white, peduncled, and form thick clusters at the ends of the branches. The calyx has four ovate, deciduous leaves, and the corolla an equal number of obovate petals, twice as long as the calyx, and inserted by narrow claws. The pod is small, elliptical, crowned with the persistent stigma, and divided into two cells, each containing from four to six seeds.

The horse-radish is a native of western Europe, growing wild on the sides of ditches and in other moist situations. It is cultivated for culinary purposes in most civilized countries, and is said to have become naturalized in some parts of the United States. Its flowers appear in June.

The root, which is officinal in its fresh state, is long, tapering, whitish externally, very white within, fleshy, of a strong pungent odour when scraped or bruised, and of a hot, biting, somewhat sweetish taste. Its virtues are imparted to water and alcohol. They depend upon a volatile oleaginous principle, which is dissipated by drying; the root becoming at first sweetish, and ultimately insipid and quite inert. Its acrimony is also destroyed by boiling. The volatile oil may be separated by distillation with water. It is pale yellow, heavier than water, very volatile, excessively pungent, acrid, and corrosive, exciting inflammation and even vesication when applied to the skin. Besides this principle, the fresh root contains, according to Gutret, a minute quantity of bitter resin, sugar, extractive, gum, starch, albumen, acetic acid, acetate and sulphate of lime, water, and lignin. (*Geiger.*) It may be kept for some time without material injury, by being buried in sand in a cool place.

Medical Properties and Uses. Horse-radish is highly stimulant, exciting the stomach when swallowed, and promoting the secretions, especially that of urine. Externally applied it is a rubefacient. Its chief use is as a condiment to promote appetite, and invigorate digestion; but it is also occasionally employed as a medicine, particularly in dropsical complaints attended with an enfeebled condition of the digestive organs, and of the system in general. It has, moreover, been recommended in palsy and chronic rheumatism, both as an internal and external remedy; and in scorbutic affections is highly esteemed. Cullen found advantage in cases of hoarseness from the use of a syrup prepared from an infusion of horse-radish and sugar, and slowly swallowed in the quantity of one or two teaspoonfuls repeated as occasion demanded. The root may be given in the dose of half a drachm or more, either grated or cut into small pieces.

Off. Prep. Cataplasma Sinapis, *Dub.;* Infusum Armoraciæ, *U.S.*, *Lond.*, *Dub.;* Spiritus Armoraciæ Compositus, *Lond.*, *Dub.* W.

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ARNICA. *U.S. Secondary.*

Leopard's-bane.

"Arnica montana. Planta. *The plant.*" *U.S.*

Off. Syn. ARNICÆ MONTANÆ FLORES. ARNICÆ MONTANÆ RADIX. *Ed.;* ARNICA MONTANA. Flores. Folia. Radix. *Dub.*

Arnique, *Fr.;* Berg-Wolverly, Gemeines ächtes Fallkraut, *Germ.;* Arnica montana, *Ital., Span.*

ARNICA. *Sex. Syst.* Syngenesia Superflua.—*Nat. Ord.* Compositæ Corymbiferæ.

Gen. Ch. *Calyx* with equal leaflets, in a double row. *Seed-down* hairy, sessile. *Seeds* both of the disc and ray furnished with seed-down. *Receptacle* hairy. *Hayne.*

Arnica montana. Willd. *Sp. Plant.* iii. 2106; Woodv. *Med. Bot.* p. 41. t. 17. This is a perennial, herbaceous plant, having a woody, brownish, horizontal root, ending abruptly, and sending forth numerous slender fibres of the same colour. The stem is about a foot high, cylindrical, striated, hairy, and terminating in one, two, or three peduncles, each bearing a flower. The radical leaves are ovate, entire, ciliated, and obtuse; those of the stem, which usually consist of two opposite pairs, are lance-shaped. Both are of a bright green colour, and somewhat pubescent on their upper surface. The flowers are very large, and of a fine orange-yellow colour. The calyx is greenish, imbricated, with lanceolate scales. The ray consists of about fourteen ligulate florets, twice as long as the calyx, striated, three-toothed, and hairy at the base; the disc, of tubular florets, with a five-lobed margin.

This plant is a native of the mountainous districts of Europe and Siberia, and is found, according to Nuttall, in the northern regions of this continent, west of the Mississippi. It has been introduced into England, and, were there a sufficient demand for it, might no doubt be cultivated in this country; but it is very little used, and in the U.S. Pharmacopœia has been placed with the medicines not considered strictly officinal. The flowers, leaves, and root have been employed in medicine; but the flowers are usually preferred.

Properties. The whole plant, when fresh, has a strong disagreeable odour, which is apt to excite sneezing, and is diminished by desiccation. The taste is acrid, bitterish, and durable. Water extracts its virtues. Chevallier and Lassaigne have discovered in the flowers, gallic acid, gum, albumen, yellow colouring matter, an odorous resin, and a bitter principle which they consider identical with that discovered by them in the seeds of the *Cytisus Laburnum*, and hence named *cytisin.* This substance is yellow, of a bitter and nauseous taste, deliquescent, readily soluble in water and diluted alcohol, but with difficulty in strong alcohol, and insoluble in ether. In the dose of five grains it is powerfully emetic and cathartic, and is supposed to be the active principle of the plant. The flowers are said also to contain a small proportion of a blue volatile oil. According to Pfaff, the root contains volatile oil, an acrid resin, extractive, gum, and lignin.

Medical Properties and Uses. Leopard's-bane is a stimulant, directed with peculiar energy to the brain and whole nervous system, as manifested by the headach, spasmodic contractions of the limbs, and difficulty of respiration, which result from its use. It acts also as an irritant to the stomach and bowels, often producing an emetic and cathartic effect; and is said by Bergius to be diuretic, diaphoretic, and emmenagogue. It is much used by the Germans, who prescribe the flowers and root with advantage in amaurosis, paralysis, and other nervous affections. It is said to prove serviceable in that disordered condition which succeeds concussion of the brain from falls, blows, &c.; and from this circumstance has received the title of *panacœa lapsorum.* It has also been recommended in intermittent fever, dysentery, diarrhœa, nephritis, gout, rheumatism, dropsy, chlorosis, and various other complaints, in most of which it seems to have been empyrically prescribed. It appears to be peculiarly useful in diseases attended with a debilitated or typhoid state of the system, to which it is adapted by its stimulant properties. The powdered leaves are sometimes employed as a sternutatory; and the inhabitants of Savoy and the Vosges are said to substitute them for tobacco. The French practitioners occasionally use the flowers of arnica, though much less extensively than the German. In England and the United States the medicine is little known. It is best given in substance or infusion. The dose of the powder is from five to ten grains frequently repeated. The infusion may be prepared by digesting an ounce in a pint of water, of which from half a fluidounce to a fluidounce may be given every two or three hours. It should always be strained through linen, in order to separate the fine fibres, which might otherwise irritate the throat. The poisonous properties of the plant are said to be best counteracted by the free use of vinegar or other dilute vegetable acid. W.

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ARTEMISIA ABSINTHIUM. Summitates florentes. *Dub.*

Flowering Tops of Wormwood.

Off. Syn. ABSINTHIUM. Artemisia Absinthium. *Lond.*; ARTEMISIÆ ABSINTHII FOLIA. ARTEMISIÆ ABSYNTHII SUMMITATES. *Ed.*

Absinthe, *Fr.*; Gemeiner Wermuth, *Germ.*; Assenzio, *Ital.*; Artemisio Axénjo, *Span.*

ARTEMISIA. *Sex. Syst.* Syngenesia Superflua.—*Nat. Ord.* Compositæ Corymbiferæ.

Gen. Ch. *Receptacle* sub-villous or nearly naked. *Seed-down* none. *Calyx* imbricate, with roundish, converging scales. *Corollas of the ray* none. *Willd.*

Several species of Artemisia have enjoyed some reputation as medicines. The leaves of the *A. Abrotanum* or southernwood have but recently been discharged from the Pharmacopœias. They have a fragrant odour, a warm, bitter, and nauseous taste; and were employed as a tonic, deobstruent, and anthelmintic. Similar virtues have been ascribed to the *A. Santonica.* The *A. pontica* has been occasionally substituted for common wormwood, but is weaker. The *A. vulgaris* or mugwort formerly enjoyed considerable reputation as an emmenagogue, and has recently come into some notice, in consequence of the recommendation of its root as a remedy in epilepsy by Dr. Burdach of Germany. For this purpose, it should be collected in autumn or early in the spring, and the side roots only dried for use. These should be powdered as they are wanted, the ligneous portion being rejected. The dose is about a drachm, to be administered in some warm vehicle in anticipation of the paroxysm, and to be repeated once or twice, at intervals of half an hour, till perspiration is produced, the patient being confined to bed. In the intervals, it may be given every second day. This is merely the revival of an old practice in Germany. The *A. vulgaris* of this country is thought by Nuttall to be a distinct species, and may not possess similar properties. In China, *moxa* is said to be prepared from the leaves of the *Artemisia Chinensis*, and *A. Indica*, which are for this reason ranked among the officinal plants by the Dublin College. (See *Moxa.*) The medicine known in Europe by the name of wormseed, is probably the product of different species of Artemisia. (See the succeeding article.) But the only species which requires particular description is the *A. Absinthium.*

Artemisia Absinthium. Willd. *Sp. Plant.* iii. 1844; Woodv. *Med. Bot.* p. 54. t. 22. Wormwood is a perennial plant, with herbaceous, branching, round and striated or furrowed stems, which rise two or three feet in height, and are panicled at their summit. The radical leaves are triply pinnatifid, with lanceolate, obtuse, dentate divisions; those of the stem doubly or simply pinnatifid, with lanceolate, somewhat acute divisions; the floral leaves are lanceolate; all are hoary. The flowers are of a brownish-yellow colour, hemispherical, pedicelled, nodding, and in erect racemes. The florets of the disc are numerous, those of the ray few.

This plant is a native of Europe, where it is also cultivated for medical use. It is among our garden herbs, and has been naturalized in the mountainous districts of New England. The leaves and flowering summits are the parts employed, the larger parts of the stalks being rejected. They should be gathered in July or August, when the plant is in flower.

Wormwood has a strong odour, and an intensely bitter, nauseous taste, which it imparts to water and alcohol. A dark green volatile oil, upon which the odour depends, is obtained by distillation. The constituents, according to Braconnot, are a very bitter, and an almost insipid azotized matter, an excessively bitter resinous substance, a green volatile oil, chlorophylle, albumen, starch, saline matters, and lignin. Among the saline substances, Braconnot found a combination of potassa with a peculiar acid, which he denominated *absinthic acid.*

Medical Properties and Uses. Wormwood is highly tonic, and has enjoyed great reputation as a remedy in numerous complaints attended with a debilitated condition of the digestive organs, or of the system generally. Before the introduction of Peruvian bark, it was much used in the treatment of intermittents. It has also been supposed to possess anthelmintic virtues. At present, however, it is little used in regular practice on this side of the Atlantic. A narcotic property has been ascribed to it by some writers, in consequence of its tendency to occasion headach, and when long continued, to produce disorder of the nervous system. This property is supposed to depend on the volatile oil, and therefore to be less obvious in the decoction than in the powder or infusion. The herb is sometimes applied externally, by way of fomentation, as an antiseptic and discutient. The dose of wormwood in substance is from one to two scruples; of the infusion made by macerating an ounce in a pint of boiling water, from one to two fluidounces.

Off. Prep. Extractum Artemisiæ Absinthii. *Dub.* W.

ARTEMISIA SANTONICA. Semina. *Dub.*

Seeds of Tartarian Southernwood.

Off. Syn. ARTEMISIÆ SANTONICÆ CACUMINA, *Ed.*

Barbotine, Sementine, *Fr.;* Wurmsame, *Germ.;* Seme Santo, *Ital.*

The wormseed of Europe are ascribed by the Edinburgh and Dublin Colleges, without sufficient authority, to the *Artemisia Santonica*, or Tartarian southernwood. They are of two kinds; one called the Aleppo, Alexandria, or Levant wormseed, the other Barbary wormseed.

The former are supposed to be the product of the *Artemisia Contra*, which grows in Persia, Asia Minor, and other parts of the East. They are in fact not the seeds, but the small globular unexpanded flowers of the plant, mixed with their broken peduncles, and with minute, obtuse, smooth leaves. They have a greenish colour, a very strong aromatic odour increased by friction, and a very bitter disagreeable taste.

The Barbary wormseed are thought by some to be derived from the *Artemisia Judaica*, by others from the *A. glomerata* of Sieber, both of which grow in Palestine and Arabia. They consist of broken peduncles, having the calyx sometimes attached to their extremity. The calyx is also sometimes separate, consisting of very small linear obtuse leaflets. The flowers are wanting, or in the shape of minute globular buds. All these parts are covered with a whitish down, which serves to distinguish this variety from the wormseed of the Levant. They are moreover lighter and more coloured than the latter. Their smell and taste are the same.

These products contain a volatile oil and a resinous extractive matter, to which their virtues have been ascribed. A peculiar principle has also been discovered in them, which has received the name of *santonin*, and which is asserted to have decided anthelmintic virtues. It is crystallizable, colourless, tasteless, inodorous, soluble in ether and alcohol, and nearly insoluble in water. It may be obtained by treating wormseed with hydrate of lime and alcohol, evaporating the tincture to one-quarter, filtering the residue to separate the resin, and treating it while hot with concentrated acetic acid. The santonin is deposited in crystals as the liquor cools. In the dose of three or four grains twice a day, it is said to have been found useful as a vermifuge. In larger doses it occasions abdominal pains, and eructations attended with a decided taste of the wormseed. (*Journ. de Pharm.* xvii. 115, and xx. 44.)

Medical Properties and Uses. The products above described have long been celebrated as a vermifuge, and the title of *semen contra*, by which they are designated in many works on pharmacy, originated in their anthelmintic property. They may be given in powder or infusion. The dose in substance is from ten to thirty grains, which should be repeated morning and evening for several days, and then followed by a brisk cathartic. They are not used in this country, having been superseded by the seeds of the *Chenopodium anthelminticum*, which are universally known among us by the name of wormseed. W.

ARUM. *U.S. Secondary.*

Dragon-root.

"Arum triphyllum. Radix. *The root.*" *U.S.*

ARUM. *Sex. Syst.* Monœcia Polyandria.—*Nat. Ord.* Aroideæ.

Gen. Ch. Spathe one-leafed, cowled. *Spadix* naked above, female below, stamineous in the middle. *Willd.*

The root of the *Arum maculatum* is occasionally used as a medicine in Europe, and held a place in the Dublin Pharmacopœia previously to the last edition. Its medicinal properties are so precisely those of the *A. triphyllum* of this country, that the substitution of the latter in our Pharmacopœia was a matter of obvious propriety, independently of the consideration that the root is efficient only in the recent state.

Arum triphyllum. Willd. *Sp. Plant.* iv. 480; Bigelow, *Am. Med. Bot.* i. 52. The *dragon-root*, *Indian turnip*, or *wake-robin*, as this plant is variously called in common language, has a perennial tuberous root, which, early in the spring, sends up a large, ovate, acuminate, variously coloured spathe, convoluted at bottom, flattened and bent over at top like a hood, and supported by an erect, round, green or purplish scape. Within the spathe is a club-shaped spadix, green, purple, black, or variegated, rounded at the end, and contracted near the base, where it is surrounded by the stamens or germs in the diœcious plants, and by both in the monœcious, the female organs being below the male. The spathe and upper portion of the spadix gradually decay, while the germs are converted into a compact bunch of shining, scarlet berries. The leaves, which are usually one or two in number, and stand on long sheathing footstalks, are composed of three ovate acuminate leaflets, paler on their under than their upper surface, and becoming glaucous as the plant advances. There are three varieties of this species of Arum, distinguished by the colour of the spathe, which in one is green, in another dark purple, and in a third white.

The plant is a native of North and South America, and is common in all parts of the United States, growing in damp woods, in swamps, along ditches, and in other moist shady places. All parts of it are highly acrid, but the root only is officinal.

This is roundish, flattened, an inch or two in diameter, covered with a brown, loose, wrinkled epidermis, and internally white, fleshy, and solid. In the recent state, it has a peculiar odour, and is violently acrid, producing, when chewed, an insupportable burning and biting sensation in the mouth and throat, which continues for a long time, and leaves an unpleasant soreness behind. According to Dr. Bigelow, its action does not readily extend through the cuticle, as the bruised root may lie upon the skin till it becomes dry, without producing pain or redness. The acrid principle is extremely volatile, and is entirely driven off by heat. It is not imparted to water, alcohol, ether, or olive oil. By exposing the bruised root and stalks to a boiling heat under water, Dr. Bigelow obtained small quantities of an inflammable gas. The root loses nearly all its acrimony by drying, and in a short time becomes quite inert. It contains a large proportion of starch, which may be obtained from it as white and delicate as from the potato. In Europe, the dried root of the *A. maculatum* is said sometimes to be employed by the country people, in times of great scarcity, as a substitute for bread. For medicinal use, the Indian turnip may be preserved fresh for a year, if buried in sand. (*Thatcher.*)

Medical Properties and Uses. Arum in its recent state is a powerful local irritant, possessing the property of stimulating the secretions, particularly those of the skin and lungs. It has been advantageously given in asthma, pertussis, chronic catarrh, chronic rheumatism, and various affections connected with a cachectic state of the system. As immediately taken from the ground, it is too acrid for use. The recently dried root, which retains a portion of the acrimony, but not sufficient to prevent its convenient administration, is usually preferred. It may be given in the dose of ten grains, mixed with gum arabic, sugar, and water, in the form of emulsion, repeated two or three times a day, and gradually increased to half a drachm or more. The powder made into a paste with honey or syrup, and placed in small quantities upon the tongue, so as to be gradually diffused over the mouth and throat, is said to have proved useful in the aphthous sore-mouth of children. W.

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ASARI FOLIA. *Lond.*

Asarabacca Leaves.

"Asarum Europæum. *Folia.*" *Lond.*

Off. Syn. ASARI EUROPÆI FOLIA. *Ed.;* ASARUM EUROPÆUM. Folia. *Dub.*

Asaret, Cabaret, *Fr.;* Haselwurzel, *Germ.;* Asaro, *Ital., Span.*

Asarum. *Sex. Syst.* Dodecandria Monogynia.—*Nat. Ord.* Aristolochiæ.

Gen. Ch. Calyx three or four-cleft, sitting on the germen. *Corolla* none. *Capsule* coriaceous, crowned. *Willd.*

Asarum Europæum. Willd. *Sp. Plant.* ii. 838; Woodv. *Med. Bot.* p. 170. t. 66. The *asarabacca* has a perennial root, with a very short, round, simple, herbaceous, pubescent stem, which in general supports only two leaves and one flower. The leaves, which are opposite and stand on long footstalks, are kidney-shaped, entire, somewhat hairy, and of a shining deep green colour. The flower is large, of a dusky purple colour, and placed upon a short terminal peduncle. The calyx, which supplies the place of a corolla, is bell-shaped, greenish at the base, and divided at the mouth into three pointed purplish segments, which are erect, and turned inwards at their extremity. The filaments are twelve, and prolonged beyond the anthers into a small hook. The style is surmounted by a six-parted reddish stigma. The fruit is a six-celled coriaceous capsule, crowned with the persistent calyx.

This species of Asarum is a native of Europe, growing between 60° and

37° N. latitude, in woods and shady places, and flowering in May. All parts of the plant are acrid. The root and leaves are officinal on the continent of Europe; the leaves only in Great Britain. The root is about as thick as a goose-quill, of a grayish colour, quadrangular, knotted and twisted, and sometimes furnished with radicles at each joint. It has a smell analogous to that of pepper, an acrid taste, and affords a grayish powder. The leaves are nearly inodorous, with a taste slightly aromatic, bitter, acrid, and nauseous. Their powder is yellowish-green. Both parts rapidly lose their activity by keeping, and ultimately become inert. Geiger, however, asserts that they keep well if perfectly dry. Their virtues are imparted to alcohol and water, but are dissipated by decoction. According to MM. Feneulle and Lassaigne, the root contains a concrete volatile oil, a very acrid fixed oil, a yellow substance analogous to *cytisin*, starch, albumen, mucilage, citric acid, and saline matters.

Medical Properties and Uses. The root and leaves of asarabacca, either fresh or carefully dried, are powerfully emetic and cathartic, and were formerly much used in Europe with a view to these effects. The dose is from thirty grains to a drachm. But as an emetic they have been entirely superseded by ipecacuanha, and are now used chiefly, if not exclusively, as an errhine. The powdered root, snuffed up the nostrils in the quantity of one or two grains, produces much irritation, and a copious flow of mucus which is said to continue sometimes for several days. The leaves are milder and generally preferred. They should be used in the quantity of three or four grains, repeated every night until the desired effect is experienced. They have been strongly recommended in headach, chronic ophthalmia, and rheumatic and paralytic affections of the face, mouth, and throat.

Off. Prep. Pulvis Asari Compositus, *Ed.*, *Dub.* W.

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ASARUM. *U. S. Secondary.*

Canada Snakeroot. Wild Ginger.

"Asarum Canadense. Radix. *The root.*" *U.S.*

Asarum. See ASARI FOLIA.

Asarum Canadense. Willd. *Sp. Plant.* ii. 838; Bigelow, *Am. Med. Bot.* i. 149; Barton, *Med. Bot.* ii. 85. This species of Asarum very closely resembles the *A. Europæum* or asarabacca in appearance and botanical character. It has a long, creeping, jointed, fleshy, yellowish root, furnished with radicles of a similar colour. The stem is very short, dividing before it emerges from the ground, into two long round hairy leaf-stalks, each of which bears a broad kidney-shaped leaf, pubescent on both surfaces, of a rich shining light green above, veined and pale or bluish beneath. A single flower stands in the fork of the stem, upon a hairy pendulous peduncle. The flower is often concealed by the loose soil or decayed vegetable matter; so that the leaves with their petioles are the only parts that appear above the surface of the ground. There is no corolla. The calyx is very woolly, and divided into three broad concave acuminate segments, with the ends reflexed, of a deep brownish-purple colour on the inside, and of a dull purple inclining to greenish externally. The filaments, which are twelve in number, and of unequal length, stand upon the germ, and rise with a slender point above the anthers attached to them. Near the divisions of the calyx, are three filamentous bodies, which may be considered as nectaries. The pistil consists of a somewhat hexagonal germ, and a conical grooved style, surmounted by six revolute stigmas. The capsule is six-celled, coriaceous, and crowned with the adhering calyx.

The Canada snakeroot, or wild ginger, is an indigenous plant, inhabiting woods and shady places from Canada to Carolina. Its flowering period is from April to July. All parts of the plant have a grateful aromatic odour, which is most powerful in the root. This is the officinal portion.

As we have seen it in the shops, it is in long, more or less contorted pieces, of a thickness from that of a straw to that of a goose-quill, brownish and wrinkled externally, whitish within, hard and brittle, and frequently furnished with short fibres. Its taste is agreeably aromatic and slightly bitter, said to be intermediate between that of ginger and serpentaria, but in our opinion bearing a closer resemblance to that of cardamom. The taste of the petioles, which usually accompany the root, is more bitter and less aromatic.

Among its constituents, according to Dr. Bigelow, are a light-coloured, pungent, and fragrant essential oil, a reddish bitter resinous matter, starch, and gum. It imparts its virtues to alcohol, and less perfectly to water.

Medical Properties and Uses. The root is an aromatic stimulant tonic, with diaphoretic properties, applicable to similar cases with the serpentaria, which it resembles in its effects. It is said to be sometimes used by the country people as a substitute for ginger. From the close botanical analogy of the plant with the European Asarum, it might be supposed, like that, to possess emetic and cathartic properties; but such does not appear to be the case, at least with the dried root. It would form an elegant adjuvant to tonic infusions and decoctions. It may be given in powder or tincture. The dose in substance is twenty or thirty grains. W.

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ASCLEPIAS INCARNATA. *U. S. Secondary.*

Flesh-coloured Asclepias.

" Asclepias incarnata. Radix. *The root.*" *U.S.*

ASCLEPIAS. See ASCLEPIAS TUBEROSA.

Asclepias incarnata. Willd. *Sp. Plant.* i. 1267. This species has an erect downy stem, branched above, two or three feet high, and furnished with opposite, nearly sessile, lanceolate, somewhat downy leaves. The flowers are red, sweet-scented, and disposed in numerous crowded erect umbels, which are generally in pairs. The nectary is entire, with its horn exserted. In one variety the flowers are white.

The plant grows in all parts of the United States, preferring a wet soil, and flowering from June to August. Upon being wounded it emits a milky juice. The root is the officinal portion. Its properties are probably similar to those of the *A. Syriaca;* but they have not, so far as we know, been fully tested. Dr. Griffith states that it has been employed by several physicians, who speak of it as a useful emetic and cathartic. (*Journ. of the Phil. Col. of Pharm.* iv. 283.) W.

ASCLEPIAS SYRIACA. *U.S. Secondary.*

Common Silk-weed.

"Asclepias Syriaca. Radix. *The root.*" *U.S.*

ASCLEPIAS. See ASCLEPIAS TUBEROSA.

A. Syriaca. Willd. *Sp. Plant.* i. 1265. The silk-weed has simple stems, from three to five feet high, with opposite, lanceolate-oblong, petiolate leaves, downy on their under surface. The flowers are large, of a pale purple colour, sweet-scented, and arranged in nodding umbels, which are two or three in number. The nectary is bidentate. The pod or follicle is covered with sharp prickles, and contains a large quantity of silky seed-down, which has been sometimes used as a substitute for fur in the manufacture of hats, and for feathers in beds and pillows.

This species of Asclepias is very common in the United States, growing in sandy fields, on the road sides, and on the banks of streams from New England to Virginia. It flowers in July and August. Like the preceding species, it gives out a white juice when wounded, and has hence received the name of *milk-weed*, by which it is frequently called.

Dr. Richardson of Massachusetts found the root possessed of anodyne properties. He gave it with advantage to an asthmatic patient, and in a case of typhous fever attended with catarrh. In both instances it appeared to promote expectoration, and to relieve pain, cough, and dyspnœa. He gave a drachm of the powdered bark of the root, in divided doses, during the day; and employed it also in strong infusion. W.

ASCLEPIAS TUBEROSA. *U.S. Secondary.*

Butterfly-weed.

"Asclepias tuberosa. Radix. *The root.*" *U.S.*

ASCLEPIAS. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Asclepiadeæ.

Gen. Ch. *Calyx* small, five-parted. *Corolla* rotate, five-parted, mostly reflexed. *Staminal crown* (or nectary) simple, five-leaved; leaflets opposite the anthers, with a subulate averted process at the base. *Stigmas* with the five angles (corpuscles) opening by longitudinal chinks. *Pollinia* five distinct pairs. *Torrey.*

Asclepias tuberosa. Willd. *Sp. Plant.* i. 1273; Bigelow, *Am. Med. Bot.* ii. 59; Barton, *Med. Bot.* i. 239. The root of the *butterfly-weed* or *pleurisy-root* is perennial, and gives origin to numerous stems, which are erect, ascending, or procumbent, round, hairy, of a green or reddish colour, branching at the top, and about three feet in height. The leaves are scattered, oblong-lanceolate, very hairy, of a deep rich green colour on their upper surface, paler beneath, and supported usually on short footstalks. They differ, however, somewhat in shape according to the variety of the plant. In the variety with decumbent stems, they are almost linear, and in another variety cordate. The flowers are of a beautiful reddish-orange colour, and disposed in terminal or lateral corymbose umbels. The fruit is an erect lanceolate follicle, with flat ovate seeds connected to a longitudinal receptacle by long silky hairs.

This plant differs from other species of Asclepias in not emitting a milky juice when wounded. It is indigenous, growing throughout the United States from Massachusetts to Georgia, and when in full bloom in the months of June and July, exhibiting a splendid appearance. It is most abundant in the Southern States. The root is the only part used in medicine.

This is large, irregularly tuberous, branching, often somewhat fusiform, fleshy, externally brown, internally white and striated, and in the recent state of a sub-acrid nauseous taste. When dried it is easily pulverized, and has a bitter but not otherwise unpleasant taste. It yields it virtues readily to boiling water.

Medical Properties and Uses. The root of the Asclepias tuberosa is diaphoretic and expectorant, without being stimulant. In large doses it is often also cathartic. In the Southern States it has long been employed by regular practitioners in catarrh, pneumonia, pleurisy, consumption, and other pectoral affections; and appears to be decidedly useful if applied in the early stages, or, after sufficient depletion, when the complaint is already formed. Its popular name of *pleurisy-root* expresses the estimation in which it is held as a remedy in this disease. It has also been used advantageously in acute rheumatism, and might probably prove beneficial in our autumnal remittents. Dr. Eberle found it highly useful in dysentery. (*Eberle's Practice*, i. 216.) Much testimony might be advanced in proof of its possessing very considerable diaphoretic powers. It is said also to be gently tonic, and has been popularly employed in pains of the stomach arising from flatulence and indigestion.

From twenty grains to a drachm of the root in powder may be given several times a day; but as a diaphoretic it is best administered in decoction or infusion, made in the proportion of an ounce to the quart of water, and given in the dose of a teacupful every two or three hours till it operates. W.

ASSAFŒTIDA. *U. S.*

Assafetida.

"Ferula assafœtida. Succus radicis concretus. *The concrete juice of the root.*" *U.S.*

Off. Syn. ASSAFŒTIDÆ GUMMI-RESINA. Ferula Assafœtida. Gummi-resina. *Lond.;* FERULÆ ASSÆFŒTIDÆ GUMMI-RESINA. *Ed.;* ASSAFŒTIDA. FERULA ASSAFŒTIDA. Gummi Resina. *Dub.*

Assafœtida, *Fr.;* Stinkasant, Teufelsdreck, *Germ.;* Assafetida, *Ital.;* Asafetida, *Span.;* Ungoozeh, *Persian;* Hilteet, *Arab.*

FERULA. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferæ.

Gen. Ch. *Fruit* oval, compressed plane, with three streaks on each side. *Willd.*

Ferula Assafœtida. Willd. *Sp. Plant.* i. 1413; Kœmpfer, *Amœnitat. Exotic.* 535. t. 536. The following description of the plant which yields assafetida is derived from that by Kœmpfer who wrote from actual observation. The root is perennial, fleshy, tapering, when of full size as large as a man's leg, beset with many strong fibres near the top, externally blackish, internally white, and abounding in an excessively fetid, opaque, milky juice. The leaves, all of which spring immediately from the root, are six or seven in number, nearly two feet long, bipinnate, with the leaflets alternate, smooth, variously sinuated and lobed, sometimes lanceolate, of a deep green colour and fetid smell. From the midst of the leaves rises a luxuriant, herbaceous stem, from six to nine feet in height, two inches in diameter at the base, simple, erect, round, smooth, striated, and terminating in large plano-convex umbels with numerous radii. The flowers are pale yellow; the seeds oval, flat, foliaceous, and of a reddish-brown colour. The plant is said to differ greatly both in the shape of its leaves, and the character of its fetid product, according to the situation and soil in which it grows.

It is a native of Persia and perhaps other countries of the East; and flourishes most abundantly in the mountainous provinces of Laar and Chorassan, where its juice is collected. Burns, in his travels into Bokhara, states that the plant is eaten with relish by the people, and that sheep crop it greedily. Some suppose that other species of Ferula contribute to the production of the assafetida of commerce.

The oldest plants are most productive, and those under four years old are not considered worth cutting. At the season when the leaves begin to fade, the earth is removed from about the top of the root, and the leaves and stem being twisted off near their base, are thrown with other vegetable matters over the root, in order to protect it from the sun. After some time the summit of the root is cut off transversely, and the juice which exudes having been scraped off, another thin slice is removed, in order to present a fresh surface for exudation. This process is repeated at intervals till the root ceases to afford juice, and perishes. During the whole period of collection, which occupies nearly six weeks, the solar heat is as much as possible excluded. The juice collected from numerous plants is put together, and allowed to harden in the sun.

Assafetida is brought to this country either from India, whither it is conveyed from Bushire, or by the route of Great Britain. It usually comes in mats or cases, the former containing eighty or ninety, the latter from two hundred to four hundred pounds. It is sometimes also imported in casks.

As found in the shops it is in irregular masses, of a softish consistence when not long exposed, of a yellowish or reddish-brown colour externally, exhibiting when broken an irregular whitish, somewhat shining surface, which soon becomes red on exposure to the air, and ultimately passes into a dull yellowish-brown. This change of colour is characteristic of assafetida. The masses appear as if composed of distinct portions intermingled and agglutinated together, sometimes of white, almost pearly tears, embedded in a darker, softer, and more fetid paste. Occasionally the tears are brought in a separate state. The odour of assafetida is alliaceous, extremely fetid, and tenacious; the taste, bitter, acrid, and durable. The effect of time and exposure is to render it more hard and brittle, and to diminish the intensity of its smell and taste, particularly the former. Kœmpfer assures us that one drachm of the fresh juice diffuses a more powerful odour through a close room than one hundred pounds of the drug as usually kept in the stores. Assafetida softens by heat without melting, and is of difficult pulverization. Its sp. gr. is 1.327. (*Berzelius.*) It is inflammable, burning with a clear, lively flame. It yields all its virtues to alcohol, and forms a clear tincture, which becomes milky on the addition of water. Macerated in water it produces a turbid red solution, and triturated with that fluid gives a white or pink-coloured milky emulsion of considerable permanence. In one hundred parts, Pelletier found 65 parts of resin, 19.44 of gum, 11.66 of bassorin, 3.60 of volatile oil, with traces of supermalate of lime. Brandes, the German chemist, obtained 4.6 parts of volatile oil, 47.25 of a bitter resin soluble in ether, 1.6 of a tasteless resin insoluble in ether, 1.0 of extractive, 19.4 of gum containing traces of potassa and lime united with sulphuric, phosphoric, acetic, and malic acids, 6.4 of bassorin, 6.2 of sulphate of lime, 3.5 of carbonate of lime, 0.4 of oxide of iron and alumina, 0.4 of malate of lime with resin, 6.0 of water, and 4.6 of impurities consisting chiefly of sand and woody fibre. The odour of the gum-resin depends on the *volatile oil*, which may be obtained separate by distillation with water or alcohol. It is lighter than water, colourless when first distilled, but becoming yellow with age, of an exceedingly offensive odour, and of a taste at first flat, but afterwards bitter and acrid. It is said to contain a small portion of sulphur. The volatile oil and the bitter resin are the active principles.

Medical Properties and Uses. The effects of assafetida on the system are those of a moderate stimulant, powerful antispasmodic, efficient expectorant, and feeble laxative. As an antispasmodic simply, it is employed in the treatment of hysteria, hypochondriasis, convulsions of various kinds, spasm of the stomach and bowels unconnected with inflammation, and in those numerous irregular nervous disorders which accompany derangement of the different organs, or result from mere debility of the nervous system. From the union of expectorant with antispasmodic powers, it is highly useful in spasmodic pectoral affections, such as hooping-cough, asthma, and certain infantile coughs and catarrhs, complicated with disorder of the nervous apparatus, or with a disposition of the system to sink. In these last cases it has been employed with great success by Dr. Jos. Parrish of Philadelphia.* In catarrhus senilis; the secondary stages of peripneumonia notha, croup, measles, and catarrh; in pulmonary consumption; in fact, in all cases of disease of the chest in which the lungs do not perform their office from want of due nervous energy, and in which inflammation is absent or has been sufficiently subdued, assafetida may occasionally be prescribed with advantage. In the form of enema it may be beneficially employed in typhoid diseases attended with inordinate accumulation of air in the bowels, and in other cases of tympanitic abdomen. The same form will be found most convenient in the hysteric paroxysm, and other kinds of convulsion. In most cases its laxative tendency adds to its advantages; but in some instances must be counteracted by the addition of laudanum. It may often be usefully combined with purgative medicines in constipation of the bowels with flatulence.

It appears to have been known in the East from very early ages; and notwithstanding its repulsive odour, is at present much used in India and Persia as a condiment. Persons soon habituate themselves to its smell, which they even learn to associate pleasantly with the agreeable effects experienced from its internal use. Children with the hooping-cough sometimes become fond of it; and older persons may be found without going so far as India, who employ it habitually.

The medium dose is ten grains, which may be given in pill or emulsion. (See *Mistura Assafœtidæ.*) The tincture is officinal, and is frequently used. When given by injection it should be prepared by trituration with warm water. From half a drachm to two drachms may be administered at once in this way. As assafetida is not apt to affect the brain injuriously, it may be given very freely when not contra-indicated by the existence of inflammatory action.

Off. Prep. Enema Fœtidum, *Dub.;* Mistura Assafœtidæ, *U.S., Lond., Dub.;* Pilulæ Assafœtidæ, *U.S.;* Pilulæ Assæfœtidæ Compositæ, *Ed.;* Pilulæ

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* See a paper by Dr. Parrish in the N. Am. Med. and Surg. Journ. vol. i. p. 24.

Alöes et Assafœtidæ, *U.S., Ed.;* Pilulæ Galbani Compositæ, *Lond.;* Spiritus Ammoniæ Fœtidus, *Lond., Dub.;* Tinct. Assafœtidæ, *U.S., Lond., Ed., Dub.;* Tinctura Castorei Composita, *Ed.* W.

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AURANTII CORTEX. *U.S.*

Orange Peel.

"Citrus aurantium Fructûs cortex exterior. *The outer rind of the fruit.*" *U.S.*

Off. Syn. AURANTII BACCÆ. Citrus Aurantium (Hispalense). Baccæ. AURANTII CORTEX. Baccarum cortex exterior. *Lond.;* CITRI AURANTII CORTEX. Cortex exterior fructûs. CITRI AURANTII SUCCUS. Succus fructûs. *Ed.;* CITRUS AURANTIUM. Fructûs succus et tunica exterior. Flores. Folia. *Dub.*

Ecorce d'orange, *Fr.;* Pomeranzenschalen, *Germ.;* Scorze del frutto dell'arancio, *Ital.;* Corteza de naranja, *Span.*

CITRUS. *Sex. Syst.* Polyadelphia Icosandria.—*Nat. Ord.* Aurantiaceæ.

Gen. Ch. Calyx five-cleft. *Petals* five, oblong. *Anthers* twenty, the filaments united into different parcels. *Berry* nine-celled. *Willd.*

This very interesting genus is composed of small evergreen trees, with ovate, or oval-lanceolate, and shining leaves, odoriferous flowers, and fruits which usually combine beauty of colour with a fragrant odour and a grateful taste. They are all natives of warm climates, and where the winters are severe require the aid of artificial heat. Though the species are not numerous, great diversity exists in the character of the fruit; and many varieties, founded upon this circumstance, are noticed by writers. In the splendid work on the natural history of the *Citrus* by Risso and Poiteau, 169 varieties are described under the eight following heads:—1. sweet oranges, 2. bitter and sour oranges, 3. bergamots, 4. limes, 5. shaddocks, 6. lumes, 7. lemons, and 8. citrons. Of these it is difficult to decide which have just claims to the rank of distinct species, and which must be considered merely as varieties. Those employed in medicine may be arranged in two sets, of which the orange, *C. Aurantium*, and the lemon, *C. Medica*, are respectively the types, the former characterized by a winged, the latter by a naked or nearly naked petiole. The form and character of the fruit which are not entirely constant, serve as the basis of the subdivisions. The *C. decumana*, which yields the shaddock, agrees with the *C. Aurantium* in the form of its petiole; but its fruit is not officinal.

Citrus Aurantium. Willd. *Sp. Plant.* iii. 1427; Woodv. *Med. Bot.* p. 523, t. 188. The orange tree grows to the height of about fifteen feet. Its stem is round, very much branched, sometimes even from the base, and covered with a smooth, shining, greenish-brown bark. In the wild state, and before inoculation, it is often furnished with axillary spines. The leaves are ovate, pointed, entire, smooth, and of a shining pale green colour. When held between the eye and the light, they exhibit numerous small transparent vesicles, filled with essential oil; and when rubbed between the fingers, are highly fragrant. Their footstalks are about an inch long, and are furnished with wings or lateral appendages. The flowers, which have a delightful odour, are large, white, and attached by short peduncles, singly or in clusters, to the smaller branches. The calyx is saucer-shaped, with pointed teeth. The petals are oblong, concave, white, and beset with numerous small glands. The filaments are united at their base in three or more distinct portions, and support yellow anthers. The germen is roundish, and bears a cylindrical style, which is terminated by a globular stigma. The fruit is a spherical berry, often somewhat flattened at its base and apex, rough, of a yellow or orange colour, and divided internally into nine vertical cells, in each of which are from two to four seeds, surrounded by a pulpy matter. The rind of the fruit is double, consisting of a thin exterior layer which abounds in vesicles filled with a fragrant essential oil, and of an interior one which is thick, white, fungous, insipid, and inodorous. There are two varieties of the *C. Aurantium*, considered by some as distinct species. They differ only in the character of the fruit, which in one is sweet, in the other sour and bitterish. The first retains the original botanical title, the second is called *Citrus vulgaris* by Risso and others. The Seville orange is the product of the latter.

This beautiful evergreen, in which the fruit is mingled, in every stage of its growth, with the blossoms and foliage, is one of those productions of the tropics which have been applied to the most numerous purposes both of utility and ornament. A native of China and India, it was introduced into Europe at a very early period, was transplanted to America soon after the first settlement of this continent, and is now found in every civilized country where the climate is favourable to its cultivation. In colder countries, it is one of the most cherished ornaments of the hot-house, though in this situation its beauties are not fully developed, and its fruit does not attain perfection. It flourishes in the most southern portion of our own country, particularly in the neighbourhood of St. Augustine in Florida, whence we annually derive a considerable supply of very fine oranges. The tree also grows in the gardens about New Orleans, but is sometimes destroyed by the frosty winters which are incident to that climate. The fruit is brought to us chiefly from the South of Europe and the West Indies. The Havana oranges have the sweetest and most pleasant flavour.

Various parts of the orange-tree are used in medicine. The leaves, which are bitter and aromatic, are employed in some places in the state of infusion as a gently incitant diaphoretic. The fresh flowers impart to water distilled from them their peculiar fragrance; and the preparation thus obtained is much esteemed in the South of Europe for its antispasmodic virtues. The distilled water of orange-flowers is recognised as officinal by the Dublin College. An oil is also obtained from the flowers by distillation, which is called *neroli* in France, and is much used in perfumery, and in the composition of *liqueurs*. It is an ingredient of the famous Cologne water. The fruit is applied to several purposes. Small unripe oranges, about the size of a cherry or less, previously dried, and rendered smooth by a turning lathe, are sometimes employed to maintain the discharge from issues. They are preferred to peas on account of their agreeable odour, and by some are thought to swell less with the moisture; but this is denied by others, and it is asserted that they require to be renewed at the end of twenty-four hours. An essential oil is obtained from them by distillation, known to the French by the name of *essence de petit grain*, and employed for similar purposes with that of the flowers. The unripe fruit is also among the Dublin officinals. All the British Colleges recognise the ripe fruit or its juice. The London directs the Seville orange. The juice of this variety is sour and bitterish, and forms with water a refreshing and grateful drink in febrile diseases. It is employed for the same purposes with the juice of the lemon, which it resembles in containing citric acid, though in much smaller proportion. The sweet orange is much more pleasant to the taste, and is very extensively used as a light refrigerant article of diet in inflammatory diseases, care being taken to reject the membranous portion, and to swallow only the pulp. The rind of the mature fruit is the only part directed by the U.S. Pharmacopœia. The outer portion is that considered officinal, as the inner is wholly destitute of useful properties, and by its affinity for moisture produces a disposition in the peel to become mouldy. The best mode of separating the outer rind, when its desiccation and preservation are desired, is to pare it from the orange in narrow strips with a sharp knife, exactly as we pare an apple. When the object is to apply the fresh rind to certain pharmaceutic purposes, as, for instance, to the preparation of the *confection of orange peel*, it is best separated by a grater. The dried peel, sold in our drug stores, is usually that of the Seville orange, and is chiefly brought from the Mediterranean.

Properties. Orange peel has a grateful aromatic odour, and a warm bitter taste, which depend upon the essential oil contained in its vesicles. The rind of the Seville orange is much more bitter than that of the other variety. Both yield their sensible properties to water and alcohol. The essential oil may be obtained by simple expression from the fresh grated rind. It has properties closely resembling those of the oil of lemons, and may be used for similar purposes.

Medical Properties and Uses. Orange peel is a mild tonic, carminative, and stomachic, but is seldom used alone. It is chiefly employed to communicate a pleasant flavour to other medicines, to correct their nauseating properties, and to assist their stimulant impression upon the stomach. It is a frequent and very useful addition to bitter infusions and decoctions, as those of gentian, quassia, columbo, and especially Peruvian bark. It is obviously improper to subject orange peel to long boiling, as the essential oil on which its virtues chiefly depend is thus driven off. The dose in substance is from half a drachm to a drachm three times a day. Large quantities are sometimes productive of mischief, especially in children, in whom violent colic, and even convulsions, are sometimes induced by it. We have known the case of a child, in which death resulted from eating the rind of an orange.

When the object in the use of orange peel is simply to obtain its agreeable flavour, the rind of the sweet orange is preferable; as a tonic, that of the Seville orange.

Off. Prep. Aqua Aurantii Corticis, *U.S., Ed.;* Confectio Aurantii Corticis, *U.S., Lond., Ed., Dub.;* Infusum Aurantii Compositum, *Lond.;* Syrupus Aurantii Corticis, *U.S., Lond., Ed., Dub.* W.

AVENÆ FARINA. *U.S.*

Oatmeal.

"Avena sativa. Farina. *The meal.*" *U.S.*

Off. Syn. AVENÆ SEMINA. Avena sativa. Semina tunicis nudata. *Lond.;* AVENÆ SATIVÆ SEMINA. Semina decorticata. AVENÆ SATIVÆ FARINA. Ex seminibus. *Ed.;* AVENA SATIVA. Farina ex seminibus. *Dub.*

Farine d'avoine, *Fr.;* Hafermehl, *Germ.;* Farina dell'avena. *Ital.;* Harina de avena *Span.*

Avena. *Sex. Syst.* Triandria Digynia.—*Nat. Ord.* Gramineæ.

Gen. Ch. Calyx two-valved, many-flowered, with a twisted awn on the back. *Willd.*

Avena sativa. Willd. *Sp. Plant.* i. 446. The common oat is so well known that a minute description would be superfluous. It is specifically distinguished by its "loose panicle, its two-seeded glumes, and its smooth seeds, one of which is awned." It was known to the ancients, and is now cultivated in all civilized countries; but its original locality has not been satisfactorily ascertained. It grows wild in Sicily, and is said to have been seen by Anson in the Island of Juan Fernandez, on the coast of Chili.

This grain, though cultivated chiefly for horses, is very nourishing, and is largely consumed as food by the inhabitants of Scotland, the North of Ireland, Brittany, and some other countries. The seeds deprived of their husk are called *groats*, and are directed by the British Colleges; but are not officinal on this side of the Atlantic. It is only the meal, prepared by grinding the seeds, that is kept in our shops.

Oatmeal contains, according to Vogel, in 100 parts, 59 of starch, 4.30 of a grayish substance resembling rather coagulated albumen than gluten, 8.25 of sugar and a bitter principle, 2.50 of gum, 2 of fixed oil, and 23.95 of fibrous matter including loss. It has no smell, is very slightly but not unpleasantly bitter, and yields most of its nutritive matter with facility to boiling water.

Gruel made with oatmeal affords a nutritious, bland, and easily digested aliment, admirably adapted to inflammatory diseases; and from its somewhat laxative tendency, preferable in certain cases to the purely mucilaginous or amylaceous preparations. It is very often administered after brisk cathartics, in order to render them easier and at the same time more efficient in their action. It is sometimes also used in the form of enema; and the meal boiled with water into a thick paste, forms an excellent emollient cataplasm. *Oatmeal gruel* may be prepared by boiling an ounce of the meal with three pints of water to a quart, straining the decoction, allowing it to stand till it cools, and then pouring off the clear liquor from the sediment. Sugar and lemon-juice may be added to improve its flavour; and raisins are not unfrequently boiled with the meal and water for the same purpose.

Off. Prep. Pulvis pro Cataplasmate, *Dub.* W.

AZEDARACH. U.S. *Secondary.*

Azedarach.

"Melia azedarach. Radicis cortex. *The bark of the root.*" *U.S.*

MELIA. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Meliaceæ.

Gen. Ch. *Calyx* five-toothed. *Petals* five. *Nectary* cylindrical, toothed, bearing the *anthers* in the throat. *Drupe* with a five-celled nut. *Willd.*

Melia Azedarach. Willd. *Sp. Plant.* ii. 558; Michaux, *N. Am. Sylv.* iii. 4. This is a beautiful tree, rising thirty or forty feet in height, with a trunk fifteen or twenty inches in diameter. When standing alone, it attains less elevation, and spreads itself out into a capacious summit. Its leaves are large, and doubly pinnate, consisting of smooth, acuminate, denticulate, dark green leaflets, which are disposed in pairs with an odd one at the end. The flowers, which are of a lilac colour and delightfully fragrant, are disposed in beautiful axillary clusters near the extremities of the branches. The fruit is a round drupe, which, when ripe, is about as large as a cherry, and of a yellowish colour.

This species of Melia is variously called *pride of India*, *pride of China*, and *common bead tree*. It is a native of Syria, Persia, and the North of India, and is cultivated for ornamental purposes in various parts of the eastern and western continents. It is abundant in our Southern States, where it lines the streets of cities, and adorns the environs of dwellings, and in some places has become naturalized. North of Virginia it does not flourish, though small trees may sometimes be seen in sheltered situations. Its flowers appear early in the spring. The fruit is sweetish to the taste, and, though said by some to be poisonous, is eaten by children at the South without inconvenience, and is even reputed to be powerfully vermifuge. But the bark of the root is the part chiefly employed. It is preferred in the recent state, and is therefore scarcely to be found in the shops at the North. It has a bitter nauseous taste, and yields its virtues to boiling water.

Medical Properties and Uses. This bark is cathartic and emetic, and in large doses is said to produce narcotic effects similar to those of Spigelia, especially if gathered at the season when the sap is mounting. It is considered in the Southern States an efficient anthelmintic, and appears to enjoy, in some places, an equal degree of confidence with the pink-root. It is thought also to be useful in those infantile remittents which resemble verminose fevers, without being dependent on the presence of worms. The form of decoction is usually preferred. A quart of water is boiled with four ounces of the fresh bark to a pint, of which the dose for a child is half a fluidounce every two or three hours, till it affects the stomach or bowels. Another plan is to give a dose morning and evening for several successive days, and then to administer an active cathartic. W.

BARYTA.

Baryta.

Baryte, *Fr.;* Baryt, Baryterde, Schwererde, *Germ.;* Barite, *Ital.;* Barito, Tierra pesada, *Span.*

This earth is not used in medicine in its uncombined state; but as several of its salts are officinal, a short notice of it may be proper.

Baryta exists in nature almost exclusively as a carbonate and sulphate. It may be obtained from the carbonate by violent ignition with carbonaceous matter, whereby the carbonic acid is decomposed and dissipated; and from the sulphate, by ignition with charcoal which converts it into a sulphuret, subsequent solution in nitric acid, and strong ignition of the nitrate formed to dissipate the acid.

Baryta, obtained by either of these processes, is anhydrous, and of a grayish-white colour. It is very refractory, requiring the flame of the compound blow-pipe for fusion. When sprinkled with water it becomes hot, and, after the lapse of some time, is reduced to the state of a fine white powder. By the addition of more water it becomes a hard, crystalline mass. In close vessels it dissolves in boiling water, forming the test called barytic water; and the solution thus obtained will yield, by proper concentration, crystals of baryta, containing a large quantity of water of crystallization.

Hydrate of baryta has an acrid, caustic, alkaline taste. It acts on the animal economy as a poison. Its sp. gr. is about 4. Exposed to a high temperature, it melts in its water of crystallization, then becomes dry, and remains in the form of powder. At a still higher temperature, it undergoes the igneous fusion and flows like oil. In this state, if poured out on a cold surface, it forms a solid of a crystalline aspect, which still retains one equivalent of water.

Baryta is the protoxide of a metal called barium, and consists of one equivalent of barium 68.7, and one equiv. of oxygen 8=76.7. *Turner, fifth Edit.*

The only preparation of baryta used in medicine is the muriate, to obtain which either the native carbonate or sulphate may be employed. These minerals are noticed in the two succeeding articles. B.

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BARYTÆ CARBONAS. *U.S.*

Carbonate of Baryta.

Off. Syn. CARBONAS BARYTÆ. *Ed.*

Carbonate de baryte, *Fr.;* Kohlensaurer Baryt, *Germ.;* Barite carbonata, *Ital.;* Carbonato de barito, *Span.*

The officinal carbonate of baryta is the native carbonate, a mineral discovered in 1783 at Anglesark in England, by Dr. Withering, in honour of whom it is sometimes called *Witherite.* It is rather a rare mineral. It is found principally in Sweden, Scotland, and England; but most abundantly in Anglesark, in Lancashire. It has not been met with in the United States. It was, indeed, announced, in Silliman's Journ. vol. ii. as occurring near Lexington, Ky., but this statement has not been confirmed. It occurs usually in small fibrous masses, but sometimes crystallized. Its sp. gr. varies from 4.2 to 4.4. Generally it is strongly translucent, but sometimes opaque. Its colour is whitish or gray, usually tinged with yellow or green, and occasionally with blue, brown, and red. It effervesces with acids, and before the blow-pipe, melts into a white enamel without losing its carbonic acid. It is distinguished from the carbonate of strontia, with which it is most liable to be confounded, by its greater specific gravity, and by the absence of a reddish flame upon burning alcohol impregnated with its nitric solution. On the animal economy, it acts as a poison. It consists of one equivalent of acid 22.12, and one of base 76.7=98.82. Its only officinal use is to obtain the muriate of baryta. (See *Barytæ Murias.*) The London College has no barytic preparations. B.

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BARYTÆ SULPHAS. *Dub.*

Sulphate of Baryta.

Off. Syn. SULPHAS BARYTÆ. *Ed.*

Ponderous spar, Baroselenite; Sulfate de baryte, *Fr.;* Schwefelsaurer Baryt, *Germ.;* Barite solfata, *Ital.*.

The native sulphate of baryta is used in pharmacy with the same view as the native carbonate; namely, to obtain the muriate. The U. S. Pharmacopœia directs for this purpose the carbonate of baryta, and the Dublin College the sulphate; while the Edinburgh College retains both, giving a separate formula for the use of each, according to the option of the operator. (See *Barytæ Murias.*)

Sulphate of baryta is a heavy mineral, varying in sp. gr. from 4.29 to 4.60. It is generally translucent, sometimes transparent or opaque, and commonly of a white colour, either pure, or with shades of yellow, red, blue, or brown. Its primitive form is a right rhombic prism. Before the blow-pipe, it strongly decrepitates, and melts into a white enamel, which, in the course of ten or twelve hours, falls to powder. By this treatment, it is partially converted into sulphuret, and, if applied to the tongue, will give a taste like that of putrid eggs, which arises from the formation of sulphuretted hydrogen. It is distinguished from the sulphate of strontia, by being free from the sulphuretted hydrogen taste after ignition on charcoal; and from the carbonates of baryta and strontia, by not effervescing with dilute nitric acid. This salt, on account of its great insolubility, is not poisonous. It consists of one equivalent of acid 40.1, and one equiv. of baryta 76.7=116.8.

Off. Prep. Barytæ Murias, *Dub.*, *Ed.* B.

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BELLADONNA. *U.S.*

Deadly Nightshade.

"Atropa belladonna. Folia. *The leaves.*" *U.S.*

Off. Syn. BELLADONNÆ FOLIA. Atropa Belladonna. Folia. *Lond.;* ATROPÆ BELLADONNÆ FOLIA, *Ed.;* ATROPA BELLADONNA. Folia et radix. *Dub.*

Belladone, *Fr.;* Gemeine Tollkirsche, Wolfskirsche, *Germ.;* Belladonna, *Ital.;* Belladona, Belladama, *Span.*

ATROPA. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Solaneæ.

Gen. Ch. Corolla bell-shaped. *Stamens* distant. *Berry* globular, two-celled. *Willd.*

Atropa Belladonna. Willd. *Sp. Plant.* i. 1017; Woodv. *Med. Bot.* p. 230. t. 82. The deadly nightshade is an herbaceous perennial plant, with a thick and fleshy root, from which rise several erect, round, purplish, branching, annual stems, to the height of about three feet. The leaves, which are attached by short footstalks to the stem, are in pairs of unequal size, oval, pointed, entire, of a dusky green colour on their upper surface, and paler beneath. The flowers are large, bell-shaped, pendent, of a dull reddish colour, and are supported upon solitary peduncles, which rise from the axils of the leaves. The fruit is a roundish berry with a longitudinal furrow on each side, at first green, afterwards red, ultimately of a deep purple colour, bearing considerable resemblance to the cherry, and containing, in two distinct cells, numerous seeds, and a sweetish violet-coloured juice. The calyx adheres to the base of the fruit.

This plant is a native of Europe, where it grows in shady places, along walls, and amidst rubbish, flowering in June and July, and ripening its fruit in September. The leaves are the only part directed by the United States, London, and Edinburgh Pharmacopœias; the root also is ordered by the Dublin College.

Properties. The dried leaves are of a dull greenish colour, with a very faint narcotic odour, and a sweetish subacrid, slightly nauseous taste. The root is long, woody, round, from one to several inches in thickness, branched and fibrous, externally when dried of a reddish-brown colour, internally whitish, and having the same taste with the leaves. Both the leaves and root, as well as all other parts of the plant, impart their active properties to water and alcohol. The juice of belladonna was analyzed by Vauquelin, who discovered in it an azotized substance, insoluble in alcohol, soluble in water, and affording a precipitate with the infusion of galls; and another substance, soluble in alcohol, of a bitter and nauseous taste, and yielding ammonia by destructive distillation. The activity of the plant he considered to reside in the latter. The German chemist, Brandes, obtained more precise results. It appeared from his analysis that the narcotic principle of belladonna was of an alkaline nature; and he supposed it to exist in the plant combined with an excess of malic acid. It was appropriately named *atropia.* Besides the malate of atropia, Mr. Brandes found in the dried herb two azotized principles, a green resin (*chlorophylle*), wax, gum, starch, albumen, lignin, and various saline ingredients. The alkaline principle was afterwards detected by M. Runge; and the fact of its existence has recently been established beyond question by the experiments of Geiger and Hesse, who obtained it from an extract prepared with the stems and leaves of the plant. It was first, however, procured in a state of purity by Mr. Mein, a German apothecary, who extracted it from the root.* *Atropia* crystallizes in white, silky prisms; is inodorous and of a bitter taste; dissolves easily in absolute alcohol and ether, but very slightly in water, and more freely in all these liquids hot than cold; melts at a temperature above 212°, and is volatilized unchanged; restores the colour of litmus paper reddened by the acids; forms soluble salts with the sulphuric, nitric, muriatic, and acetic acids; and, in a very dilute solution, produces, when applied to the eye, a speedy and durable dilatation of the pupil. Like the other vegetable alkalies, it consists of carbon, hydrogen, oxygen, and nitrogen.

Medical Properties and Uses. The action of belladonna is that of a powerful narcotic, possessing also diaphoretic and diuretic properties, and somewhat disposed to operate upon the bowels. Orfila infers from his experiments, and from known facts, that it has little intensity of local action, but is absorbed, and entering the circulation, exercises its influence upon the nervous system, especially upon the brain. Among the first obvious effects which it produces when taken in the usual dose, and continued for some time, are dryness and stricture of the fauces and neighbouring parts, with slight uneasiness or giddiness of the head, and more or less dimness of vision. The practitioner should watch for these effects as signs of the activity of the medicine, and should gradually increase the dose till some one of them is experienced in a slight degree, unless the object at which he aims should be previously attained; but so soon as they occur the dose should be diminished, or the use of the narcotic suspended for a time. When taken in too large a quantity, belladonna is capable of producing the most deleterious effects. It is in fact a powerful poison, and many instances are recorded in which it has been accidentally swallowed or purposely administered with fatal consequences. All parts of the plant are poisonous. It is not uncommon, in countries where the belladonna grows wild, for children to pick and eat the berries, allured by their fine colour and sweet taste. Soon after the poison has been swallowed, its peculiar influence is experienced in dryness of the mouth and fauces, great thirst, difficult deglutition, nausea and ineffectual retching, vertigo, intoxication or delirium attended with violent gestures and sometimes with fits of laughter, and followed by a comatose state. The pupil is dilated and insensible to light, the face red and tumid, the mouth and jaws spasmodically affected, the stomach and bowels insusceptible of impressions, in fact the whole nervous system prostrate and paralyzed. A feeble pulse, cold extremities, subsultus tendinum, deep coma or delirium, and sometimes convulsions, precede the fatal termination. Dissection discloses appearances of inflammation in the stomach and intestines; and it is said that the body soon begins to putrefy, swells, and becomes covered with livid spots, while dark blood flows from the mouth, nose, and ears. To obviate the poisonous effects of belladonna, the most effectual method is to evacuate the stomach as speedily as possible, either by means of emetics, or the stomach-pump, and afterwards to cleanse the bowels by purgatives and enemata. It is not probable that vinegar, which has been recommended, can be of any essential service as an antidote: the infusion of galls might possibly be useful, and, if the experiments of M. Runge can be relied on, lime-water or the alkaline solutions would render the poisonous matter which remained in the stomach inert.

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* The following is the process employed by Mein. The roots of plants two or three years old were selected. Of these, reduced to an extremely fine powder, 24 parts were digested, for several days, with 60 parts of alcohol of 86 or 90 per cent. The liquid having been separated by strong expression, the residue was treated anew with an equal quantity of alcohol; and the tinctures, poured together and filtered, were mixed with one part of hydrate of lime, and frequently shaken for twenty-four hours. The copious precipitate which now formed was separated by filtering; and diluted sulphuric acid was added drop by drop to the filtered liquor, till slightly in excess. The sulphate of lime having been separated by a new filtration, the alcoholic liquid was distilled to one-half, then mixed with 6 or 8 parts of pure water, and evaporated with a gentle heat till the whole of the alcohol was driven off. The residual liquid was filtered, cautiously evaporated to one-third, and allowed to cool. A concentrated aqueous solution of carbonate of potassa was then gradually added, so long as the liquid continued to be rendered turbid; and the mixture was afterwards suffered to rest some hours. A yellowish resinous substance which opposes the crystallization of the atropia was thus precipitated. From this the liquid was carefully decanted, and a small additional quantity of the solution of the carbonate was dropped into it, till it no longer became turbid. A gelatinous mass now gradually formed, which, at the end of twelve or twenty-four hours, was agitated in order to separate the mother-waters, then thrown upon a filter, and dried by folds of unsized paper. The substance thus obtained, which was atropia in an impure state, was dissolved in five times its weight of alcohol; and the solution, having been filtered, was mixed with six or eight times its bulk of water. The liquor soon became milky, or was rendered so by evaporating the excess of alcohol, and, in the course of twelve or twenty-four hours, deposited the atropia in the form of light yellow crystals, which were rendered entirely pure and colourless by washing with a few drops of water, drying on blotting paper, and again treating with alcohol as before. From twelve ounces of the root, Mein obtained by this process twenty grains of the pure alkali. (*Journ. de Pharm.* xx. 87.)

Notwithstanding the tremendous energy of this narcotic when taken in very large doses, it has been used as a medicine, even from very early times. The leaves were first employed externally to discuss scirrhous tumours, and heal cancerous and other ill-conditioned ulcers; and were afterwards administered internally for the same purpose. Much evidence of their beneficial influence in these affections is on record, and even Dr. Cullen has spoken in their favour; but this application of the remedy has fallen into disuse. It is at present more esteemed in nervous diseases. The German practitioners are much in the habit of using it in hooping-cough, in the advanced stages of which it is undoubtedly sometimes beneficial. In neuralgia it is one of the most effectual remedies in our possession; and we ourselves can bear testimony to its usefulness in this complaint. Hufeland recommends it in the convulsions dependent on scrofulous irritation. It has been prescribed also in chorea, epilepsy, hydrophobia, mania, paralysis, amaurosis, rheumatism, gout, obstinate intermittents, dropsy and jaundice; and in such of these affections as have their seat chiefly in the nervous system, it may sometimes do good. It is said to have been effectually employed in several cases of strangulated hernia. In Germany it has within a few years acquired great credit as a preventive of scarlatina—an application of the remedy first suggested by the famous author of the *homœopathic* doctrine,* and founded upon the idea, that, as the symptoms produced by scarlatina in the nervous system closely resemble those which result from large doses of belladonna, the former might be prevented, or at least moderated, by establishing the latter, as small-pox is prevented by vaccination, or rendered milder if the system has already come partially under its influence.

Applied to the eye, belladonna has the property of dilating the pupil exceedingly, and for this purpose is sometimes employed by European oculists previously to the operation for cataract. In cases of partial opacity of the crystalline lens, confined to the centre of that body, vision is temporarily improved by a similar use of the remedy; and it may also perhaps be beneficially used, when, from inflammation of the iris, there is danger of a permanent closure of the pupil. For these purposes, a strong infusion of the plant, or a solution of the extract, may be dropped into the eye, or a little of the extract itself rubbed upon the eyelids. The same application of the remedy has been recommended in cases of morbid sensibility of the eye. The decoction or extract of belladonna applied to the neck of the uterus, is asserted to have hastened tedious labour dependent on rigidity of the os tincæ.

Belladonna may be given in substance, infusion, or extract. The dose of the powdered leaves is for children from the eighth to the fourth of a grain, for adults one or two grains, repeated daily, or twice a day, and gradually increased till the peculiar effects of the medicine are experienced. An infusion may be prepared by adding a scruple of the dried leaves to ten fluidounces of boiling water, of which from one to two fluidounces is the dose for an adult. The extract is more used in the United States than any other preparation. (See *Extractum Belladonnæ.*) It is by dropping into the eye a strong infusion, or a solution of the extract, that the dilating effect of belladonna upon the pupil is obtained.

Off. Prep. Extractum Belladonnæ, *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

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BENZOINUM. *U.S.*

Benzoin.

"Styrax benzoin. Succus concretus. *The concrete juice.*" *U.S.*

Off. Syn. BENZOINUM. Styrax Benzoin. Balsamum. *Lond.;* STYRACIS BENZOINI BALSAMUM, *Ed.;* STYRAX BENZOIN. Resina. *Dub.*

Benjoin, *Fr.;* Benzoe, *Germ.;* Belzoino, *Ital.;* Benjui, *Span.*

The botanical source of benzoin was long uncertain. At one time it was generally supposed in Europe to be derived from the *Laurus Benzoin* of this country. This error was corrected by Linnæus, who, however, committed another, in ascribing the drug to the *Croton Benzoë*, a shrub which he afterwards described under the name of *Terminalia Benzoin.* Mr. Dryander was the first who ascertained the true benzoin tree to be a *Styrax;* and his description, published in the 77th vol. of the English Philosoph. Transact., has been copied by most subsequent writers. The specimen by which Mr. Dryander decided the generic character, was obtained by Sir Jos. Banks from Mr. Marsden at Sumatra.

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* Hahnemann of Leipsick.

STYRAX. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Guaiacinæ, *Juss.;* Styraceæ, *Richard*, *Lindley.*

Gen.Ch. *Calyx* inferior. *Corolla* funnelshaped. *Drupe* two-seeded. *Willd.*

Styrax Benzoin. Willd. *Sp. Plant.* ii. 623; Woodv. *Med. Bot.* p. 294. t. 102. This is a tall tree of quick growth, sending off many strong round branches, covered with a whitish downy bark. Its leaves are alternate, entire, oblong, pointed, smooth above and downy beneath. The flowers are in compound, axillary clusters, nearly as long as the leaves, and usually hang all on the same side upon short slender pedicels.

The benzoin, or benjamin tree as it is sometimes called, is a native of Sumatra, Java, Laos, and Siam. (*Ainslie.*) By wounding the bark near the origin of the lower branches, a juice exudes, which hardens upon exposure, and constitutes the *benzoin* of commerce. A tree is thought of a proper age to be wounded at six years, when its trunk is about seven or eight inches in diameter. The operation is performed annually, and the product on each occasion from one tree never exceeds three pounds. The juice which first flows is the purest, and affords the whitest and most fragrant benzoin. It is exported chiefly from Acheen in Sumatra, and comes into the western markets in large masses packed in chests and casks, and presenting externally the impression of the reed mats in which they were originally contained.

Two kinds of benzoin are distinguishable in the market, one consisting chiefly of whitish tears united by a reddish brown connecting medium, the other of brown or blackish masses, without tears. The first is the most valuable, and has been called *benzoë amygdaloides*, from the resemblance of the white grains to fragments of blanched almonds: the second is sometimes called *benzoë in sortis*—benzoin in sorts—and usually contains numerous impurities. Between these two kinds there is every gradation. We have seen specimens of this balsam consisting exclusively of yellowish-white homogeneous fragments, which, when broken, presented a perfectly smooth, clear white, shining surface. These were no doubt identical in constitution with the tears of the larger masses.

Properties. Benzoin has an agreeable and fragrant odour, with very little taste; but when chewed for some time, leaves a sense of irritation in the mouth and fauces. It breaks with a resinous fracture, and presents a mottled surface of white and brown or reddish-brown; the white spots being smooth and shining, while the remainder, though sometimes shining and even translucent, is usually more or less rough and porous, and often exhibits impurities. In the inferior kinds, the white spots are very few or entirely wanting. Benzoin is easily pulverized, and while in the process of being powdered is apt to excite sneezing. Its sp. gr. is from 1.063 to 1.092. When heated, it melts and emits thick, white, pungent fumes, which excite cough when inhaled, and consist chiefly of benzoic acid. It is wholly soluble, with the exception of impurities, in alcohol; and is precipitated by water from its solution, rendering the liquor milky like the gum-resins. It imparts to boiling water a notable proportion of benzoic acid. Lime-water and the alkaline solutions partially dissolve it, forming benzoates, from which the acid may be precipitated by the addition of another, having stronger affinity for the base. Its chief constituents are resin and benzoic acid; and it therefore belongs to the balsams. The white tears, and the brownish connecting medium, are said by Stolze to contain very nearly the same proportion of acid, which, according to Bucholz, is 12.5 per cent., to Stolze 19.8 per cent. The resin is of three different kinds, one extracted from the balsam along with the benzoic acid by a boiling solution of carbonate of potassa in excess, another dissolved by ether from the residue, and the third affected by neither of these solvents. Besides benzoic acid and resin, the balsam contains a minute proportion of extractive, and traces of volatile oil.

Medical Properties and Uses. Benzoin, like the other balsams, is stimulant and expectorant, and was formerly employed in various pectoral affections; but, except as an ingredient of the compound tincture of benzoin, it has fallen into almost entire disuse. It is employed in pharmacy for the preparation of benzoic acid (see *Acidum Benzoicum*); and the milky liquor resulting from the addition of water to its alcoholic solution, is sometimes used as a cosmetic, under the impression that it renders the skin soft and tender. In the East Indies it is burnt by the Hindoos as a perfume in their temples.

Off. Prep. Acidum Benzoicum, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Tinctura Benzoini Composita, *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

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BISMUTHUM. *U. S.*, *Lond.*, *Dub.*

Bismuth.

Tinglass; Etain de glace, Bismuth, *Fr.;* Wissmuth, *Germ.;* Bismuto, *Ital.;* Bismut. *Span.*

Bismuth is a peculiar metal, occurring usually in the metallic state, occasionally as a sulphuret, and rarely as an oxide. It is by no means generally diffused, being principally found in Saxony, Bohemia, and Transylvania. It occurs also in Cornwall, and has been found at Monroe, Conn., seventeen miles west of New-Haven, which is the only known locality in the United States. It is obtained almost entirely from the native bismuth. which is heated by means of wood or charcoal, whereby the metal is fused and becomes separated from its gangue. Almost all the bismuth of commerce comes from Saxony.

Bismuth was first distinguished as a peculiar metal by Agricola, in his treatise entitled Bermanus, published in 1520. Before that period, it was confounded with lead. It is a brittle, brilliant metal, of a peculiar yellowish-white colour and crystalline texture. Its crystals are in the form of cubes. It undergoes but a slight tarnish in the air. Its sp. gr. is 9.822, and its melting point 497°. At a high temperature, in close vessels, it volatilizes, and may be distilled over. When heated in the open air to a full red heat, it takes fire, and burns with a small blue flame, forming an oxide of a yellow colour. This is the *protoxide*, and consists of one equivalent of bismuth 71, and one equiv. of oxygen 8 = 79. Besides this oxide, bismuth forms a *sesquioxide* of a brown colour, very like the peroxide of lead, and consisting of two equiv. of metal 142, and three of oxygen 24 = 166. Bismuth is acted on feebly by muriatic acid, but violently by nitric acid, which dissolves it with a copious extrication of red fumes. Sulphuric acid when cold has no action on it, but at a boiling heat effects its solution with the extrication of sulphurous acid. As it occurs in commerce, it is generally contaminated with a little arsenic, the presence of which may be detected by its not being completely soluble in an excess of nitric acid. It may be purified from all contaminating metals, by dissolving the bismuth of commerce in nitric acid, precipitating the clear solution with water, and reducing the white powder thus obtained with black flux.

Pharm. Uses, &c. Bismuth, in an uncombined state, is not used in medicine, but is employed pharmaceutically to obtain the subnitrate of bismuth, the only medicinal preparation formed from this metal. In the arts, it is used to form a cosmetic, or white paint for the complexion, called *pearl white;* and it enters into the composition of the best pewter. Its consumption is limited by the small quantity of the metal which is supplied to commerce; this being computed not to exceed annually eleven or twelve thousand pounds.

Off. Prep. Bismuthi Subnitras, *U.S., Lond., Dub.* B.

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BISTORTÆ RADIX. *Lond.*

Bistort Root.

"Polygonum Bistorta. *Radix.*" *Lond.*

Off. Syn. POLYGONI BISTORTÆ RADIX. *Ed.;* POLYGONUM BISTORTA. Radix. *Dub.*

Bistorte, *Fr.;* Natter-Wurzel, *Germ.;* Bistorta, *Ital., Span.*

POLYGONUM. *Sex. Syst.* Octandria Trigynia.—*Nat. Ord.* Polygoneæ.

Gen. Ch. Corolla five-parted, calycine. *Seed* one, angular. *Willd.*

Besides the bistort, some other plants belonging to this genus, have been used as medicines. Among these are the *P. aviculare* or knot-grass, a mild astringent formerly employed as a vulnerary and styptic; the *P. Persicaria* (Persicaria mitis), of a feebly astringent saline taste, and at one time considered antiseptic; and the *P. Hydropiper* or water-pepper (Persicaria urens), the leaves of which have a burning and biting taste, inflame the skin when rubbed upon it, and are esteemed diuretic. The water-pepper or smart-weed of this country—*P. punctatum* (Elliott), *P. Hydropiperoides* (Michaux), which grows abundantly in moist places, possesses properties similar to those of the European water-pepper, and is occasionally used as a detergent in chronic ulcers, and internally in gravel. Dr. Eberle very strongly recommends it in amenorrhœa, in which complaint he has found no other remedy equally effectual. He gives a fluidrachm of the saturated tincture of the plant, or from four to six grains of the extract, three or four times a day. He has found it to produce a warmth and peculiar tingling sensation throughout the system, with slight aching pains in the hips and loins, and a sense of weight and tension within the pelvis. (*Eberle's Mat. Med. 4th ed.* vol. i. p. 441.) The *P. Fagopyrum* is the common buckwheat.

Polygonum Bistorta. Willd. *Sp. Plant.* ii. 441; Woodv. *Med. Bot.* p. 668. t. 232. This plant has a perennial root, and an annual herbaceous stem, which is simple, erect, jointed, and rises one or two feet in height. The lower leaves are cordato-lanceolate, and supported on long winged footstalks; the upper are ovate, almost sessile, amplexicaule, and sheathing. The flowers are of a pale rose colour, and form a close terminal spike. The plant is a native of Europe and the North of Asia.

The root, which is the officinal portion, is cylindrical, somewhat flattened, about as thick as the little finger, marked with annular or transverse wrinkles, furnished with numerous fibres, and folded or bent upon itself, so as to give it the tortuous appearance from which its name was derived. When dried, it is solid, brittle, of a deep brown colour externally, reddish within, destitute of smell, and possessed of a rough, astringent taste. It contains much tannin, some gallic acid and gum, and a large proportion of starch.

Medical Properties. Bistort resembles the other vegetable astringents, such as galls, kino, &c., in medical properties, and is applicable to the same complaints; but in this country is seldom or never used. It may be employed in the form of decoction or of powder. The dose of the latter is twenty or thirty grains, three or four times a day. W.

BOLETUS IGNIARIUS. *Ed.*

Agaric of the Oak. Touchwood. Spunk.

Amadouvier, Agaric de Chêne, *Fr.;* Feuerschwamm, *Germ.;* Esca, *Ital,;* Agarico, *Span.*

Boletus. *Sex. Syst.* Cryptogamia Fungi.—*Nat. Ord.* Fungi.

Gen. Ch. Fungus horizontal, porous beneath.

Several species belonging to this genus of mushrooms are used as food, several are poisonous, and two at least are officinal in Europe. The *Boletus laricis*, which grows upon the larch of the old world, is the *white agaric* or *purging agaric*, of medical writers. It is of various sizes, from that of the fist to that of a child's head, or even larger, hard and spongy, externally brownish or reddish; but as found in commerce, is deprived of its exterior coat, and consists of a light, white, spongy, somewhat farinaceous, friable mass, which, though capable of being rubbed into powder upon a sieve, is not easily pulverized in the ordinary mode, as it flattens under the pestle. It has a sweetish very bitter taste, and consists, according to Braconnot, of 72 parts of resinous matter, 2 of bitter extractive, and 26 of fungin, a nutritious animalized principle, constituting the base of the fleshy substance of mushrooms. It contains also benzoic acid and various saline compounds. In the dose of four or six grains it is said to act powerfully as a cathartic; but Lieutaud asserts that it may be given in the quantity of thirty grains or a drachm without sensibly purging. M. Andral has found it useful in checking the night sweats of phthisis. He uses it in doses of eight grains, and gradually increases to a drachm during the day, without any observable inconvenience of the digestive functions. (*Journ. de Pharm.* xx. 599.) In this country it is scarcely employed, though we have met with it in the shops. That which is most esteemed is said to be brought from Siberia, but it is probably produced wherever the European larch tree grows. The species of Boletus which is directed by the Edinburgh College is the *B. igniarius*, which grows upon the decayed trunks of the oak, ash, and various other trees, and is common to the old and new continents.

Boletus igniarius. Sowerby, *Fung.* t. 34; Woodv. *Med. Bot.* p. 808. t. 273. The *Agaric of the oak*, like the species just described, is compared in shape to the horses hoof. Its diameter is from six to ten inches. When young it is soft like velvet, but afterwards becomes hard and ligneous. It usually rests immediately upon the bark of the tree, without any supporting footstalk. On the upper surface it is smooth, but marked with circular ridges of different colours more or less brown or blackish; on the under, it is whitish or yellowish and full of small pores; internally it is fibrous, tough, and of a tawny brown colour. It is composed of short tubular fibres compactly arranged in layers, one of which is added every year. The best is that which grows on the oak, and the season for collecting it is August or September. It has neither taste nor smell. Its constituents, according to Bouillon-Lagrange, are extractive, resin in very small proportion, animal matter also in small quantity, muriate of potassa, and sulphate of lime; and in its ashes are found iron and phosphate of lime and magnesia.

It is prepared for use by removing the exterior rind or bark, cutting the inner part into thin slices, and beating these with a hammer until they become soft, pliable, and easily torn by the fingers. In this state it was formerly much used by surgeons for arresting hemorrhage. If steeped in a solution of nitre, and afterwards dried, it becomes very readily inflammable, and is applicable to the purposes of tinder. Some recommend the substitution of chlorate of potassa for nitre. The preparation is usually known by the name of *spunk*, and is brought to us from Europe.

Spunk or tinder, the *amadou* of the French, is in flat pieces, of a consistence somewhat like that of very soft rotten buckskin leather, of a brownish-yellow colour, capable of absorbing liquids, and inflammable by the slightest spark. It is said to be prepared from various other species of Boletus, as the *B. ungulatus*, *B. fomentarius*, *B. ribis*, &c.

Medical Properties, &c. The prepared agaric was at one time thought to have a peculiar property of arresting hemorrhage when compressed upon a bleeding vessel; but it is now believed to act mechanically, like any other soft porous substance, by absorbing the blood and causing it to coagulate, and is not relied on in severe cases. In the obstinate hemorrhage which occasionally takes place from leech bites, especially those of the European leech, it may be used advantageously, though perhaps not more so than well prepared lint.

It has been sometimes applied to the purposes of moxa. W.

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CALAMUS. *U.S. Secondary.*

Sweet Flag.

"Acorus calamus. Radix. *The root.*" *U.S.*

Off. Syn. CALAMI RADIX. Acorus Calamus. Radix. *Lond.;* ACORI CALAMI RADIX. *Ed.*

Acorus vrai, Acorus odorant, *Fr.;* Kalmuswurzel, *Germ.;* Calamo aromatico, *Ital., Span.*

Acorus. *Sex. Syst.* Hexandria Monogynia.—*Nat. Ord.* Aroideæ.

Gen. Ch. Spadix cylindrical, covered with florets. *Corolla* six-petalled, naked. *Style* none. *Capsule* three-celled. *Willd.*

Acorus Calamus. Willd. *Sp. Plant.* ii. 199; Barton, *Med. Bot.* ii. 63. The sweet flag, or calamus, has a perennial, horizontal, jointed, somewhat compressed root, from half an inch to an inch thick, sometimes several feet in length, sending off numerous round and yellowish or whitish fibres from its base, and bunches of brown fibres resembling coarse hair from its joints, internally white and spongy, externally whitish with a tinge of green, variegated with triangular shades of light brown and rose colour. The leaves are all radical, sheathing at the base, long, sword-shaped, smooth, green above, but of a red colour variegated with green and white near their origin from the root. The scape or flower-stem resembles the leaves, but is longer, and from one side, near the middle of its length, sends out a cylindrical spadix, tapering at each end, about two inches in length, and crowded with greenish-yellow flowers. These are without calyx, and have six small, concave, membranous, truncated petals. The fruit is an oblong capsule, divided into three cells, and containing numerous oval seeds.

This is an indigenous plant, growing abundantly throughout the United States, in low, wet, swampy places, and along the sides of ditches and streams, and flowering in May and June. It is also a native of Europe and Western Asia; and a variety of the same species is found in India. The European plant differs from the American in some unimportant particulars. The leaves as well as root have an aromatic odour; but the latter only is used in medicine. After removal from the ground, the roots are washed, freed from their numerous fibres, and dried with a moderate heat. By the process of drying they lose nearly one half their diameter, but are improved in odour and taste.

Properties. The roots, as found in the shops, are in pieces of various lengths, somewhat flattened, externally wrinkled and of a yellowish-brown colour, and presenting on their under surface numerous minute circular spots, indicating the points at which the fibres were inserted. Their texture is light and spongy, their colour internally whitish or yellowish-white, and their fracture short and rough. Sometimes pieces are brought into the market consisting exclusively of the interior portion of the root. They are usually long, slender, irregularly quadrangular, and of a grayish-white colour; and are prepared by paring off the outer coat with a knife. The odour of calamus is strong and fragrant; its taste, warm, bitterish, pungent, and aromatic. Its active principles are taken up by boiling water. From one hundred parts of the fresh root of the European plant, Trommsdorff obtained 0.1 part of volatile oil, 2.3 of a soft resin, 3.3 of extractive with a little muriate of potassa, 5.5 of gum with some phosphate of potassa, 1.6 of starch analogous to inulin, 21.5 of lignin, and 65.7 of water. Sixteen ounces of the dried root afforded to Neumann about two scruples of volatile oil. The oil is at first yellow, but ultimately becomes red, and has the smell and taste of calamus. The extractive matter has an acrid and sweetish taste. The root is sometimes attacked by worms, and deteriorates by keeping.

The root of the Indian variety is said to be less thick than the European, and to have a stronger and more pleasant taste and smell. It is supposed by some to be the true calamus of the ancients, though the claims of either variety to this honour have not been certainly established.

Medical Properties and Uses. Calamus is a stimulant tonic, possessing the ordinary virtues of the aromatics. It may be taken with advantage in pain or uneasiness of the stomach or bowels arising from flatulence; and forms a useful adjuvant to tonic or purgative medicines in cases of torpor or debility of the alimentary canal. The calamus of the ancients was in high repute; and its virtues are celebrated in the works of Pliny and Dioscorides. By modern physicians the medicine is much neglected, though well calculated to answer as a substitute for more costly aromatics. The dose in substance is from a scruple to a drachm. An infusion, made in the proportion of an ounce of the root to a pint of boiling water, is sometimes given in the dose of a wineglassful or more. W.

CALX. *U. S., Lond., Dub.*

Lime.

Quicklime; Chaux, *Fr.;* Kalk, *Germ.;* Calce, *Ital.;* Calviva, *Span.*

Lime is placed in the materia medica list of the United States, Edinburgh, and Dublin Pharmacopœias, but among the Preparations in the London. It is a very important pharmaceutical agent, and forms the basis or principal ingredient in several standard preparations.

Lime is a very abundant natural production. It is never found pure, but mostly combined with acids; as for example, with carbonic acid in chalk, marble, calcareous spar, limestone, and shells; with sulphuric acid in the different species of gypsum or plaster of Paris; with phosphoric acid in the bones of animals, and with silica in a great variety of minerals.

Preparation. Lime is prepared by calcining, with a strong heat, some form of the native carbonate. The carbonic acid is thus expelled, and the lime remains behind. When the lime is intended for nice chemical operations, it ought to be obtained from pure white marble or oyster shells. For the purposes of the arts, it is generally procured from common limestone, by calcining it in kilns of peculiar construction. When obtained in this way, it is generally impure, being of a grayish colour, and containing alumina, silica, and oxide of iron, and occasionally a little magnesia and oxide of manganese.

The officinal lime of the United States, Edinburgh, and Dublin Pharmacopœias is the lime of commerce, and is, therefore, impure. That of the London College is comparatively pure. It is directed by this College, to be prepared by taking a pound of white marble, and exposing it, broken into pieces, in a crucible, to a violent heat for an hour, or until the carbonic acid has been entirely expelled; so that on the addition of dilute acetic acid, no effervescence is produced. This College also prepares another variety of lime from oyster shells, by the method just given. (See *Calx è Testis.*)

It may well be questioned whether it is necessary to have a purer officinal lime than the commercial varieties of this earth; and hence whether the London College is judicious in giving a formula for its preparation from white marble. In pharmaceutical processes, where the lime acts as a mere chemical agent, its entire purity is not essential; and in preparing lime-water, the usual impurities in the commercial lime, being insoluble, would not prove hurtful.

Properties. Lime is a white solid, having a strong, caustic, alkaline taste, and the sp. gr. 2.3. It is very refractory in the fire, having been fused only by the compound blow-pipe of Dr. Hare. Exposed to the air, it absorbs moisture and carbonic acid, and falls to powder. In this state, it is a mixture of carbonate and hydrate. On account of this liability to change by being kept, the Edinburgh and Dublin Colleges direct their officinal lime to be recently burnt. It acts upon vegetable colours as a strong alkaline base, changing syrup of violets green, and tincture of tumeric, red. It has a strong affinity for water, and is capable of combining with it both as a hydrate and a solution. When sprinkled with this liquid, it heats, produces a hissing noise, and is reduced to the state of a white pulverulent hydrate. In this state, it is called slaked lime. It is but sparingly soluble in water, requiring about seven hundred times its weight of that liquid for complete solution at the temperature of 60°. In hot water, contrary to the general law, it is less soluble than in cold. The solution formed is called lime-water.

Lime is the oxide of a peculiar metal, called calcium, and consists of one equivalent of calcium 20.5, and one equiv. of oxygen 8 = 28.5. It is distinguished from the other earths by forming a very deliquescent salt with muriatic acid, and a very voluminous and sparingly soluble one with sulphuric acid. All acids and acidulous salts, alkaline carbonates, ammoniacal and metallic salts, borates, and astringent vegetable infusions, are incompatible with it. It forms a numerous class of salts with acids, several of which are officinal.

Medical Properties. Lime acts externally as an escharotic, and was formerly applied to ill-conditioned ulcers. It is a powerful antacid; but when used with this intention, it is always administered in solution. (See *Liquor Calcis.*) Its principal uses connected with medicine are as a pharmaceutical agent.

Economical Uses. The uses of lime in the arts are numerous. It is employed in the fabrication of soap, to render the fixed alkalies caustic; as a manure for fertilizing fields; and mixed with sand and water, as the ordinary cement of buildings. When it improves the fertility of lands, it does not act as an aliment to the plants, but merely as an agent in accelerating the decomposition of the organic remains existing in the soil.

Off. Prep. Liquor Calcis, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Potassa cum Calce, *Lond.*, *Ed.*, *Dub.* B.

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CALCII CHLORIDUM. *U.S.*

Chloride of Calcium.

Off. Syn. CALCIS MURIAS. *Lond.*, *Dub.*

Muriate of lime; Chlorure de calcium, Hydrochlorate de chaux, *Fr.;* Chlorcalcium, Salzsaurer Kalk, *Germ.*

Chloride of calcium is a compound of chlorine and the metallic radical of lime, called calcium. It is placed in the list of the materia medica in the United States Pharmacopœia, but among the Preparations in the London and Dublin, under the name of muriate of lime. It may be readily formed by saturating muriatic acid with marble or chalk, evaporating to dryness, and heating to redness. The muriatic acid, by reacting with the lime, forms chloride of calcium and water, the latter of which is dissipated at a red heat.

The London College forms this chloride by taking two pounds of the salt which remains after the sublimation of carbonate of ammonia, and acting on it with water. The solution obtained is filtered and evaporated to dryness, and the dry mass kept in well-stopped bottles. The residuum here employed is chloride of calcium, mixed with some carbonate of lime; and the process of the College has for its object merely to purify the chloride from the carbonate, the water dissolving the former, and leaving the latter.

In making chloride of calcium, the Dublin College uses the residuum of their process for obtaining water of ammonia. The latter preparation being procured by the action of lime on muriate of ammonia, the residuum is evidently a solution of chloride of calcium, or muriate of lime; but it generally contains adhering ammonia and an excess of lime. Any quantity of this residuum is taken, and, after being filtered, is evaporated to dryness. The excess of lime may be saturated with muriatic acid, or converted into an insoluble carbonate by exposing the solution for some time to the air.

Properties. Chloride of calcium is an acrid, bitter, and very deliquescent salt, soluble in about one-fourth of its weight of water at 60°. It crystallizes, but with difficulty, in six-sided prisms. Its crystals, on exposure to heat, first dissolve in their water of crystallization, and after this has evaporated, undergo the igneous fusion. This salt produces cold by its solution, and is an efficient ingredient in freezing mixtures. On account of its avidity for water, it is used for drying gases, and for bringing alcohol to its highest degree of concentration. It is employed for the latter purpose by the Dublin College. When sulphuric acid is added to a concentrated solution of it, muriatic acid gas is copiously evolved, and the whole becomes a thick mass of sulphate of lime. A similar change in consistence is produced by the addition of a concentrated solution of potassa, in consequence of the precipitation of lime.

Chloride of calcium exists in the solid state in the materials from which nitre is extracted, and in solution in the water of the ocean and of many springs. It is usually associated with common salt and muriate of magnesia, from which salts it is separated with difficulty.

Composition. Chloride of calcium consists of one equivalent of chlorine 35.42, and one equiv. of calcium 20.5=55.92. When crystallized, it contains six equiv. of water=54. On the old theory, which made it a dry muriate, it was supposed to consist of one equiv. of hypothetical dry muriatic acid 27.42, and one equiv. of lime 28.5, giving the same equiv. for the compound as by the other view. On the new theory also, it may, when in solution, be assumed to be a muriate, generated by the hydrogen of water combining with the chlorine, and its oxygen with the calcium.

Medical Properties. Chloride of calcium is deobstruent and tonic. It is occasionally administered in pill, combined with conium; but is chiefly used medicinally in the form of solution, when it may be considered to become a muriate of lime. In this form it is officinal in the United States and British Pharmacopœias. For its medical properties more in detail, see *Liquor Calcis Muriatis.*

Off. Prep. Liquor Calcis Muriatis, *Lond.*, *Dub.* B

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CALCIS CARBONAS, *U.S.*

Carbonate of Lime.

Off. Syn. CRETA. *Lond.;* CARBONAS CALCIS MOLLIOR. CRETA ALBA. *Ed.;* CALCIS CARBONAS. CRETA ALBA. *Dub.*

Chalk; Carbonate de chaux, Craie, *Fr.;* Kohlensaurer Kalk, Kreide, *Germ.;* Calce carbonate, Creta, *Ital.;* Greda, *Span.*, *Port.*

Carbonate of lime, in the chemical sense, is the salt formed by the combination of carbonic acid with lime, whether occurring native or formed artificially, and under whatever form it may be observed. In the pharmaceutical sense, however, of the United States Pharmacopœia, it means that peculiar variety of native carbonate of lime, which is soft and friable, and known under the common name of *chalk.*

Carbonate of lime, in the extended meaning of the term, is the most abundant of simple minerals, constituting, according to its state of aggregation and other peculiarities, the different varieties of calcareous spar, common and shell limestone, marble, marl, and chalk. It occurs also in the animal kingdom, forming the principal part of the shells of many animals. Though insoluble in pure water, yet it is present in minute quantity in most natural waters, being dissolved in the carbonic acid which they contain. In the waters of limestone districts, it is a very usual impregnation, and causes purging in those not accustomed to their use. In all such cases, boiling the water, by expelling the carbonic acid, causes the carbonate to be deposited. Besides being officinal in its soft state as chalk, carbonate of lime is also ordered as it exists in marble, oyster-shells, crabs' claws, and crabs' stones. (See *Calcis Carbonas Durus*, U.S.; *Testa*, U.S.; *Carbonas Calcis ex Cancro Paguro*, Ed.; *Carbonas Calcis ex Cancro Astacho*, Ed.) In the present article we shall restrict our observations to chalk.

Localities. Chalk occurs abundantly in the South of England and North of France, and is found also in Ireland, Poland, and several islands of the Baltic. It has not been discovered in the United States, and the consumption of this country is supplied from England. It occurs massive in beds, and very frequently contains nodules of flint, and fossil remains of land and marine animals.

Properties. Chalk is an insipid, inodorous, insoluble, opaque solid, generally white, but sometimes yellowish, or grayish-white. It is rough to the touch, moderately hard and easily pulverized, and breaks with an earthy fracture. It soils the fingers, yields a trace when drawn across an unyielding surface, and when applied to the tongue adheres slightly. Its sp. gr. varies from 2.3 to 2.6. It is not a perfectly pure carbonate of lime, but contains, besides gritty siliceous particles, minute portions of alumina and of oxide of iron. Like all carbonates, it effervesces with acids, and with the muriatic forms a very deliquescent salt. Though insoluble in water, it dissolves in an excess of carbonic acid. It consists, like the other varieties of carbonate of lime, of one equivalent of carbonic acid 22.12, and one equiv. of lime $28.5=50.62$.

Pharmaceutical Uses. Chalk, on account of its hardness and the gritty particles which it contains, is unfit for medical use, until it has undergone levigation, when it forms the prepared carbonate of lime. (See *Calcis Carbonas Præparatus.*)

Off. Prep. Calcis Carbonas Præparatus, *U.S.*, *Lond.*, *Ed.*, *Dub.* B.

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CALCIS CARBONAS DURUS. *U.S.*

Hard Carbonate of Lime.

Off. Syn. MARMOR ALBUM, *Lond.;* CARBONAS CALCIS DURIOR. MARMOR ALBUM, *Ed.;* CALCIS CARBONAS. MARMOR ALBUM. *Dub.*

White marble; Marbre, *Fr.;* Marmor, *Germ.;* Marmo, *Ital.;* Marmol, *Span.*

By "hard carbonate of lime," in the United States Pharmacopœia, is intended to be designated that variety of granular limestone, familiarly called white marble. Its principal officinal use is to yield carbonic acid by the action of the strong acids, in order to impregnate water and various solutions with it. For this purpose, no nicety is required in the selection of the limestone employed; but for other purposes, such as for preparing the solution of muriate of lime, a pure carbonate is necessary, and hence white marble is selected.

The whitest and purest marbles are the Carara, Luni, and Parian; but it is not expected, nor is it desirable that these should be exclusively selected for pharmaceutical use. Good marble abounds in most parts of the world, and in the United States, pure kinds are to be met with in numerous localities. White marble may be known by its colour and granular texture, and by its effervescing with acids. Its sp. gr. varies from 2.7 to 2.84. In composition it agrees with the carbonate of lime.

Off. Prep. Liquor Calcis Muriatis. *U.S.*, *Ed.;* Calx, *Lond.* B.

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CARBONAS CALCIS EX CANCRO ASTACHO, *vulgo* LAPILLI CANCRORUM. *Ed.*

Carbonate of Lime from the Crawfish, commonly called *Crab Stones.*

Crabs' eyes; Yeux d'écrevisse, *Fr.;* Krebsaugen, Krebssteine, *Germ;* Ojos de cangrejo, *Span.*

The officinal crab stones are a peculiar concretion, found in the stomach, one on each side, of the European crawfish, at the time the animal is about to change its shell. After the new shell is completed, they disappear; and hence, with every appearance of probability, they may be considered as intended to assist in its formation.

The crawfish of Europe is now referred to the genus *Astacus*, and is called *Astacus fluviatilis* by Fabricius. It is a small animal, having a general resemblance to the lobster. The snout is projecting, and serrated on the sides; and the thorax and back are smooth, the latter being furnished laterally with two small spines. The large claws are studded with small tubercles. The two first pairs of legs are clawed, the two next subulated, and the tail is five-jointed with rounded fins. It inhabits lakes and rivers.

The crawfish of Europe has not been found in the United States; but two American species of Astacus, closely allied to the *A. fluviatilis*, and confounded under the name of crawfish, or fresh-water lobster, have been described, one by Bosc under the name of *A. Bartonii*, the other by Say under the appellation of *A. affinis*. The former is very common, inhabiting rivulets and small streams of fresh water. The latter is larger than the *Bartonii*, and bears a very close resemblance to the European species, to which Mr. Say states he would have referred it, had it not been for the circumstance that in his species, the claws are not tuberculated. We are not informed whether the American species are furnished with the stomachic concretions; but there is every reason to believe that they follow the analogy of the European crawfish in this respect.

Crab stones are most abundantly procured in the province of Astracan in Asiatic Russia. The crawfish are bruised with wooden mallets and laid up in heaps to putrefy. The animal remains are then washed away, and the stones picked out.

Properties. Crab stones are inodorous, insipid bodies, somewhat hemispherical in shape, of a white or reddish colour, hard and stony consistence, and laminated texture. They are very variable in size, weighing from one to twelve grains each. They effervesce with acids, but in consequence of the animal matter which they contain, do not entirely dissolve, but become converted into a soft transparent mass, retaining the original shape of the stone. By this character they are distinguished from counterfeit stones, which are sometimes fabricated from chalk, mixed with mucilaginous substances. In composition they resemble crabs' claws, their constituents being carbonate and phosphate of lime, cemented together by animal matter.

Medical Properties. Crab stones are occasionally used as an absorbent and to correct acidity in the primæ viæ; but it may well be doubted whether, for these purposes, they are equal in efficacy to the common prepared chalk. Before being exhibited they require to be prepared by levigation, a circumstance omitted to be stated in the Edinburgh Pharmacopœia. The dose varies from one to two drachms, suspended in any proper vehicle. (See *Calcis Carbonas Præparatus*, U.S.) B.

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CARBONAS CALCIS EX CANCRO PAGURO, *vulgo* CHELÆ CANCRORUM. *Ed.*

Carbonate of Lime from the Black-clawed Crab, commonly called *Crabs' Claws.*

Serres d'écrevisse, *Fr.;* Krebsscheeren, *Germ.;* Chele di granchi, *Ital.;* Pierna de cangrejo, *Span.*

This form of carbonate of lime is not to be found in the London, Dublin, or United States Pharmacopœias; and it is very properly omitted, as no effect could be expected from it, which might not be better obtained from the use either of prepared chalk, or prepared oyster-shells.

We are indebted to Mr. Hatchett and Mérat-Guillot for our knowledge of the composition of the coverings of the crustaceous animals. They are found to be composed of a large quantity of carbonate of lime, a small quantity of the phosphate of lime, and a portion of animal matter of the nature of coagulated albumen. We are not acquainted with any analysis of the officinal crabs' claws; but the crust of the lobster, which must be nearly identical, was found by Mérat-Guillot to consist, in the 100 parts, of carbonate of lime 60, phosphate of lime 14, and animal matter 26.

It is not at all probable that the phosphate of lime and animal matter in crabs' claws, confer upon them any peculiar powers as a medicinal agent; and hence their introduction into the materia medica may be considered as a useless refinement. When used, they must be prepared by trituration and levigation; and yet the Edinburgh College has omitted to give any directions to that effect.

The animal designated by the Edinburgh College as furnishing this form of carbonate of lime, is the *Cancer pagurus*, a species of European crab, not found in our waters. It is probable, however, that the edible crab of our country (*Lupa hastata*) would furnish an identical preparation.

Medical Properties. Crabs' claws act as an absorbent and antacid, but are less efficacious in these respects than prepared carbonate of lime. (See *Calcis Carbonas Præparatus.* U.S.)

B.

CAMPHORA. *U.S.*

Camphor.

"Dryobalanops camphora. *Colebrooke.* Laurus camphora. *Willd.* Concretum sui generis. *A peculiar concrete substance.*" *U.S.*

Off.Syn. CAMPHORA. Laurus Camphora, Concretum sui generis sublimatione paratum. *Lond.;* CAMPHORA. Ex Lauro Camphora. *Ed.;* CAMPHORA. LAURUS CAMPHORA. DRYOBALANOPS CAMPHORA. Camphora. *Dub.*

Camphre, *Fr.;* Kampher, *Germ.;* Canfora, *Ital.;* Alcanfor, *Span.*

Camphor is not confined to any one species or even genus of plants. Though not an abundant principle, it is widely diffused; existing not only in the plants recognised by the U.S. Pharmacopœia, but also in the roots of the cinnamon, cassia, and sassafras laurels; in those of the galanga, zedoary, and ginger; in the seeds of the cardamom and long-pepper; and in the essential oils of lavender, sage, thyme, peppermint, and rosemary. It varies somewhat in properties, as furnished by these various plants; and in most of them exists in quantities too small to admit of profitable extraction. The inhabitants of Ceylon are said to procure it from the root of the *Laurus Cinnamomum;* and Zea describes a variety which exudes from the bark of an unknown tree in South America, and is collected by the natives; but the camphor of commerce is derived exclusively from the *Laurus Camphora* and the *Dryobalanops Camphora.*

1. *Laurus Camphora.*

Laurus. *Sex.Syst.* Enneandria Monogynia.—*Nat. Ord.* Laurineæ.

Gen.Ch. *Calyx* none. *Corolla* calycine, six-parted. *Nectary* with three two-bristled glands, surrounding the germ. *Filaments* interior, glanduliferous. *Drupe* one-seeded. *Willd.*

Among the species composing the genus Laurus of Linn., such striking differences have been observed in the structure of the flower and fruit, that some botanists have been induced to arrange them in new genera, which do not, however, yet appear to have been sufficiently established to authorize their adoption in this work. The camphor, cinnamon, and sassafras laurels are referred by Sprengel to the genus Persea of Gærtner, while even this has been divided by other botanists.

Laurus Camphora. Willd. *Sp. Plant.* ii. 478; Woodv. *Med. Bot.* p. 681. t. 236.—*Persea Camphora.* Sprengel. The camphor laurel is an evergreen tree of considerable size, having the aspect of the linden, with a trunk straight below, but divided above into many branches, which are covered with a smooth greenish bark. Its leaves, which stand alternately upon long footstalks, are ovate lanceolate, entire, smooth and shining, ribbed, of a pale yellowish-green colour on their upper surface, glaucous on the under, and two or three inches in length. The flowers are small, white, pedicelled, and collected in clusters, which are supported by long axillary peduncles. The fruit is a red berry resembling that of the cinnamon. It is a native of the most eastern parts of Asia, and is found abundantly in China and Japan. It has been introduced into the botanical gardens of Europe, and is occasionally met with in the hot-houses of our own country; but we are informed by Woodville, that in England, though it often appears sufficiently luxuriant and healthy, it very rarely produces flowers.

The camphor is diffused through all parts of the plant, and is obtained from the root, trunk, and branches, by sublimation. The process is not precisely the same in all places; but the following is perhaps the most prevalent. The parts mentioned, particularly the roots and smaller branches, are cut into chips, which are placed, with a little water, in large iron vessels, surmounted by earthen capitals, furnished with a lining of rice-straw. A moderate heat is then applied, and the camphor, volatilized by the steam of the boiling water, rises into the capital, where it is condensed upon the straw.

2. *Dryobalanops Camphora.*

It was long since known that an excellent variety of camphor was produced in the islands of Sumatra and Borneo, by a forest tree which was thought by some to belong to the genus Laurus, by others was considered wholly distinct, but which, not having been seen by scientific botanists, remained for a long period undescribed. Kœmpfer stated that it was not akin to the laurel; and Dr. Roxburgh, from a rough sketch of the fruit and leaf which he received while in India, was induced to refer it to the genus Shorea; under the title of *S. camphorifera;* but though belonging to the same natural family with the Shorea, it differs in its generic character. This, Mr. Colebrooke, president of the Asiatic Society, was at length enabled to decide, from specimens of the seeds and some living plants which came into his possession. His description, however, is somewhat defective, as the plants soon died, and he had no opportunity of inspecting the flower in its perfect state. The genus he ascertained to be the Dryobalanops of the younger Gærtner, founded upon a specimen which had been received from India, but with very incorrect information as to the locality and uses of the plant from which it was derived.

Dryobalanops. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Diterocarpeæ.

Gen. Ch. Calyx one-leaved, permanent, enlarged into a gibbous cup, with five ligulate, long scariose wings. *Corolla* five-petalled. *Capsule* three-valved, one-celled. *Seed* solitary. *Embryo* inverse, without perisperm.

Dryobalanops Camphora. Colebrooke, *Asiat. Research.* xii. 539. This is the only known species of its genus. It is a very large forest tree, attaining sometimes to the height of one hundred feet, with a trunk six or seven feet in diameter. The bark is of a brownish colour. The leaves are alternate above, opposite below, elliptical, obtusely acuminate, with parallel veins, entire, smooth, nearly four inches long, and rather more than an inch broad. The flowers, according to Houttuyn, are large and like those of the tulip. This tree is a native of Sumatra and Borneo, growing abundantly on the N. W. coast of the former island, and ranking among the tallest and largest trees of that luxuriant country.

The camphor of the Dryobalanops exists in concrete masses, which occupy longitudinal cavities or fissures in the heart of the tree, from a foot to a foot and a half long, at certain distances apart. The younger trees are generally less productive than the old; and the number of those which furnish a quantity of the drug sufficient for extraction is comparatively small. The natives have no certain means of discovering the trees which contain the camphor, except by making incisions into them. A party proceeds through the forest, wounding the trees till they find one which will answer their purpose, and hundreds may be examined before this object is attained. When discovered, the tree is felled and cut into logs, which are then split, and the camphor removed. The greater part is taken out by sharp-pointed instruments; and the sides of the cavity are then scraped, so as to separate any adhering portion. The latter is less highly valued, in consequence of the small chips or fragments of wood which are mingled with it. The masses are sometimes as thick as a man's arm; and the product of a middling sized tree is nearly eleven pounds; of a large one, double the quantity. The trees which have been cut and left standing, often produce camphor seven or eight years afterwards. The Dryobalanops also yields a fragrant liquid, called in the East Indies *oil of camphor*, and highly valued as an external application in rheumatic and other painful affections. It is said to be found in trees which have not attained a sufficient age to produce camphor, and is supposed to constitute the first stage in the development of this substance, as it occupies the same cavities in the trunk, which are afterwards filled with the camphor. It holds in fact a large proportion of this principle in solution, and may be made to yield an inferior variety by artificial concretion. It is highly probable that the camphor is deposited from it by a natural crystallization in the crevices of the wood where it is found. The whole tree is probably pervaded by this camphorous juice, as the wood retains a fragrant smell, and being on this account less liable to the attacks of insects, is highly esteemed for carpenters' work.

Commercial History. Camphor is brought to this country from Calcutta, Batavia, and Canton; and frequently also from London, where it is purchased at the East India Company's sales. Most, if not all of it, is derived, originally from the dominions of China and Japan; though Ainslee states, that the greater part of the camphor found in the India bazaars, is obtained from Sumatra and Borneo. It is possible that the inferior qualities of that obtained from the Dryobalanops Camphora in these islands, may be taken to Calcutta, and thence enter the general market; but the quantity must be small, as the product of this tree is nearly all engrossed by the Chinese, by whom it is said to be so highly valued, that it commands at Canton from twelve to twenty times the price of ordinary camphor. Dr. Duncan, in the last edition of his Dispensatory, describes a specimen of the camphor of the Dryobalanops in his possession, as being in tabular plates, somewhat translucent, easily pulverizable without the addition of alcohol, more compact and heavy than common camphor, not agglutinating like this when in powder, nor rising spontaneously in vapour so as to crystallize on the sides of the bottles in which it is contained. We have not seen any parcel that answers to this description in our market; and the probability is, that little or none is imported.

Crude camphor, as brought from the East, is usually in small grains or granular masses, which are of a dirty white colour, and are frequently mingled with extraneous matters. In this state it is never found in the shop of the apothecary. It must be refined before it can be used for medicinal purposes. The process for refining camphor was first practised in Europe by the Venetians, who probably derived it from the Chinese. It was afterwards transferred to the Dutch, who long enjoyed a monopoly of this business; and it is only within a few years, that the process has been generally known. It is now practised largely in this country, and the camphor refined in our domestic establishments is equal to any that was formerly imported. The crude camphor is mixed with a small proportion of quicklime,* and exposed in a glass or earthenware vessel placed in a sand bath, to a gradually increasing heat, by which it is melted, and ultimately converted into vapour, which condenses in a suitable recipient. Refined in this manner, it is usually in the form of large circular cakes, one or two inches thick, convex on one side, concave on the other, and perforated in the centre.

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* Six drachms of lime to two pounds and a half of camphor, French weight, or about 1 part to 50, is the proportion employed in the process of M. Clémandot, which enjoys some reputation in France. *Journ. de Pharm.* ii. 321.

Properties. Camphor has a peculiar, strong, penetrating, fragrant odour; and a bitter, pungent taste, attended with a slight sense of coolness. It is beautifully white and pellucid, somewhat unctuous to the touch, friable, and yet possessed of a degree of tenacity which renders its reduction to a fine powder very difficult, unless the cohesion of its particles be overcome by the addition of a minute proportion of alcohol or other volatile liquid for which it has an affinity. It has a shining fracture, and a crystalline texture. Its sp. gr. varies from 0.9857 to 0.996. It therefore floats upon water, on the surface of which, if thrown in small fragments, it assumes very singular circulatory movements, which cease upon the addition of a drop of oil. Its volatility is so great, that even at ordinary temperatures it is wholly dissipated if left exposed to the air. It melts at 288° F. and boils at 400°. (*Turner.*) In close vessels it may be sublimed unchanged. When allowed to concrete slowly from the state of vapour, it assumes the form of hexagonal plates. Dr. Paris tells us, on the authority of Mr. W. Phillips, that the native crystal of camphor is a flat octohedron. It is not altered by air and light. It readily takes fire, and burns with a brilliant flame, giving out much smoke, and leaving no residue. Water triturated with camphor dissolves a very minute proportion, not more, according to Berzelius, than the thousandth part of its weight; which, however, is sufficient to impart a decided odour and taste to the solvent. By the intervention of sugar or magnesia, particularly of the latter, a much larger proportion of the camphor is dissolved. (See *Aqua Camphoræ.*) Carbonic acid also increases the solvent power of water. Alcohol will take up seventy-five per cent. of its weight of camphor, which is precipitated upon the addition of water. Berzelius states, that 100 parts of alcohol of the sp. gr. 0.806, dissolve 120 parts at 50° F. It is soluble also without change in ether, the volatile and fixed oils, strong acetic acid, and the diluted mineral acids. By the action of strong sulphuric and nitric acids it is decomposed, the former carbonizing and converting it into artificial tannin; the latter, by the aid of repeated distillation, into a peculiar acid called the *camphoric*. The alkalies produce very little effect upon it. The resins unite with it, forming a soft tenacious mass; and a similar softening effect results when it is triturated with the concrete oils. Exposed to a strong heat in close vessels, camphor is decomposed, being resolved into a volatile oil and charcoal. It is closely analogous in character to the essential oils. Berzelius considers it a stearoptene entirely free from any mixture of eleoptene. (See *Olea Volatilia.*) According to M. Dumas, it consists of a peculiar base called *camphene* united with oxygen. Camphene, is a volatile liquid, composed of 8 equiv. of hydrogen 8, and 10 equiv. of carbon 61.2=69.2. With 1 equiv. of oxyen it forms camphor, with 2 equiv. of the same body camphoric acid, and with 1 equiv. of hydrochloric acid, artificial camphor.

Medical Properties and Uses. Camphor does not seem to have been known to the ancient Greeks and Romans. Europe probably derived it from the Arabians, by whom it was employed as a refrigerant. Much difference of opinion has prevailed as to its mode of action, some maintaining its immediate sedative influence, others considering it as a direct and decided stimulant. Its operation appears to be primarily and chiefly directed to the cerebral and nervous systems; and the circulation, though usually affected to a greater or less extent, is probably involved only through the agency of the brain. The effects of the medicine vary with the quantity administered. In moderate doses it produces, in a healthy individual, mental exhilaration, increased heat of skin, and occasional diaphoresis. The pulse is usually increased in fulness, but little, if at all, in force or frequency. According to the recent experiments of certain Italian physicians, it appears to have a tendency to the urinary and genital organs, producing a burning sensation along the urethra, and exciting voluptuous dreams.* Cullen, however, states that he has employed it fifty times, even in large doses, without having ever observed any effect upon the urinary passages. In its primary operation it also allays nervous irritation, quiets restlessness, and produces a general placidity of feeling, which renders it highly useful in certain forms of disease attended with derangement of the nervous functions. In larger doses it displays a more decided action on the brain, producing more or less giddiness and mental confusion, with a disposition to sleep; and in morbid states of the system, relieving pain, and allaying spasmodic action. In immoderate doses it occasions nausea, vomiting, anxiety, faintness, vertigo, delirium, insensibility, coma, convulsions, and sometimes death. The pulse, under these circumstances, is at first reduced in frequency and force;† but as the action advances, it sometimes happens that symptoms of strong sanguineous determination to the head become evident, in the flushed countenance, inflamed and fiery eyes, and highly excited pulse.‡

By its moderately stimulating powers, its diaphoretic tendency, and its influence over the nervous system, it is admirably adapted to the treatment of all diseases of a typhoid character, which combine with the enfeebled condition of the system, a frequent irritated pulse, a dry skin, and much nervous derangement, indicated by restlessness, watchfulness, tremors, subsultus, and low muttering delirium. Nor are its beneficial effects confined to typhoid diseases. With a view to its anodyne and narcotic influence, it is often used in those of an inflammatory character, as in our ordinary remittents, and the phlegmasiæ, particularly rheumatism, when the increased vascular action is complicated with derangement of the nervous system. In such cases, however, it should never be used until after proper depletion, and even then should be combined with such medicines as may obviate the slight stimulation it produces, and give it a more decided tendency to the skin; as, for instance, tartarized antimony, ipecacuanha, or nitre. In a great number of spasmodic and nervous disorders, and complaints of irritation, camphor has been very extensively employed. The cases of this nature to which experience has proved it to be best adapted, are dysmenorrhœa, puerperal convulsions and other nervous affections of the puerperal state, and certain forms of mania, particularly nymphomania, and that arising from the abuse of spirituous liquors. In some of these cases advantage may be derived from combining it with opium. Camphor has also been employed internally to allay that irritation of the urinary organs which is apt to be produced by cantharides.

It is much used externally as a local anodyne, generally dissolved in alcohol, oil, or acetic acid, and frequently combined with laudanum. In rheumatic and gouty affections, and various internal spasmodic and inflammatory complaints, it often yields relief when applied in this way. The ardor urinæ of gonorrhœa may be alleviated by injecting an oleaginous solution of camphor into the urethra; and the tenesmus from ascarides and dysentery, by administering the same solution in the form of enema. A scruple or half a drachm of camphor in substance, added to a poultice, and applied to the perineum, allays the chordee, which is a painful attendant upon gonorrhœa.

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* N. Am. Med. and Surg. Journ. vol. ix. p. 442.

† Alexander. Experimental Essays, p. 227.—Orfila.

‡ Quarin, quoted by Woodville, Med. Bot., 2d ed., vol. iv. p. 687.

The vapour of camphor has been inhaled into the lungs with benefit in cases of spasmodic cough; and a lump of it held to the nose is said to relieve that unpleasant fulness of the nostrils and coryza which attend a commencing catarrh.

Camphor may be given in substance in the form of bolus or pill, or diffused in water by trituration with various substances. The form of pill is objectionable, as in this state the camphor is with difficulty dissolved in the gastric liquors, and floating on the top, is apt to excite nausea, or pain and uneasiness at the upper orifice of the stomach. Orfila states, that when given in the solid form it is capable of producing ulceration in the gastric mucous membrane. The emulsion is almost always preferred. This is made by rubbing up the camphor with loaf sugar, gum Arabic, and water; and the suspension will be rendered more complete and permanent by the addition of a little myrrh. Milk is sometimes used as a vehicle, but is objectionable, as it is apt to become sour very speedily. The aqueous solution is often employed where only a slight impression is desired. For this purpose, the *Aqua Camphoræ* of the United States Pharmacopœia is preferable to the solution effected by simply pouring boiling water upon a lump of camphor, which is sometimes prescribed under the name of *camphor tea.*

The medium dose of camphor is from five to ten grains; but to meet various indications it may be diminished to a single grain or extended to a scruple. The injurious effects of an overdose are said to be best counteracted, after clearing out the stomach, by the use of opium.

Off. Prep. Acidum Aceticum Camphoratum, *Ed.*, *Dub.;* Aqua Camphoræ, *U.S.;* Emulsio Camphoræ, *Ed.;* Linimentum Camphoræ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Linimentum Camphoræ Compositum, *Lond.*, *Dub.;* Linimentum Hydrargyri, *Lond.;* Linimentum Saponis Camphoratum, *U.S.*, *Lond.;* Mistura Camphoræ, *Lond.*, *Dub.;* Mistura Camphoræ cum Magnesiâ, *Dub.;* Tinctura Camphoræ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Tinctura Opii Camphorata, *U.S.*, *Lond.*, *Ed.;* Tinctura Saponis Camphorata, *U.S.*, *Ed.*, *Dub.;* Tinctura Saponis et Opii, *Ed.*, *Dub.* W.

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CANELLA. *U.S.*

Canella.

"Canella alba. Cortex. *The bark.*" *U.S.*

Off. Syn. CANELLÆ CORTEX. Canella alba. Cortex. *Lond.;* CANELLÆ ALBÆ CORTEX. *Ed.;* CANELLA ALBA. Cortex. *Dub.*

Cannelle blanche, *Fr.;* Weisser Zimmt, Canell, *Germ.;* Cannella bianca, *Ital.;* Canela blanca, *Span.*

CANELLA. *Sex. Syst.* Dodecandria Monogynia.—*Nat. Ord.* Meliaceæ.

Gen. Ch. Calyx three-lobed. *Petals* five. *Anthers* sixteen, adhering to an urceolate nectary. *Berry* one-celled with two or four seeds. *Willd.*

Canella was first made a distinct genus by the celebrated Professor Murray. It had previously been confounded, under the name of *Winterania*, with that to which the tree that produces the Winter's bark belongs. The latter is now recognised as a distinct genus with the title of *Drymis* or *Wintera.*

Canella alba. Willd. *Sp. Plant.* ii. 851; Woodv. *Med. Bot.* p. 694. t. 237. This is an erect tree, rising sometimes to the height of fifty feet, branching only at the top, and covered with a whitish bark, by which it is easily distinguished from other trees in the woods where it grows. The leaves are alternate, petiolate, oblong, obtuse, entire, of a dark green colour, thick and shining like those of the laurel, and of a similar odour. The flowers are small, of a violet colour, and grow in clusters upon divided footstalks, at the extremities of the branches. The fruit is an oblong berry, containing one, two, or three black and shining seeds.

The Canella alba grows naturally in Jamaica and other West India islands. The bark of the branches, which is the part employed in medicine, having been removed by an iron instrument, is deprived of its epidermis, and dried in the shade. It comes to us in pieces partially or completely quilled, of various sizes, from a few inches to two feet in length, from half a line to two or even three lines in thickness, and in the quill from half an inch to an inch and a half in diameter.

Properties. Canella has a pale orange-yellow colour usually lighter on the inner surface, an aromatic odour somewhat resembling that of cloves, and a warm, bitterish, very pungent taste. It is brittle, breaking with a short fracture, and yielding when pulverized a yellowish-white powder. Boiling water extracts nearly one-fourth of its weight; but the infusion, though bitter, has comparatively little of the warmth and pungency of the bark. It yields all its virtues to alcohol, forming a bright yellow tincture, which is rendered milky by the addition of water. By distillation with water it affords a large proportion of a yellow or reddish, fragrant, and very acrid essential oil. It contains, moreover, according to the analysis of MM. Petroz and Robinet, a saccharine substance resembling mannite, a peculiar very bitter extractive, resin, gum, starch, albumen, and various saline substances in small proportion. Canella has been sometimes confounded with Winter's bark, from which, however, it differs both in sensible properties and composition. It contains, for instance, no tannin nor oxide of iron, both of which are ingredients in the latter. (See *Wintera.*)

Medical Properties and Uses. Canella is possessed of the ordinary properties of the aromatics, acting as a local stimulant, and gentle tonic, and producing upon the stomach a warming cordial effect, which renders it useful as an addition to tonic or purgative medicines in debilitated states of the digestive organs. It is scarcely ever prescribed except in combination. In the West Indies it is employed by the negroes as a condiment, and has some reputation as an antiscorbutic.

Off. Prep. Pulvis Aloes et Canellæ, *U.S.*, *Dub.;* Tinctura Gentianæ Composita, *Ed.;* Vinum Alöes, *Lond.*, *Dub.;* Vinum Gentianæ Compositum, *U.S.*, *Ed.* W.

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CANTHARIS. *U.S.*

Spanish Flies.

"Cantharis vesicatoria, *Olivier;* Meloë vesicatorius, *Linn.;* Lytta vesicatoria, *Fabricius.*" *U.S.*

Off. Syn. CANTHARIS. Cantharis vesicatoria. *Lond.;* CANTHARIS VESICATORIA. *Ed.*, *Dub.*

Cantharide, *Fr.;* Spanische Fliege, Kantharide, *Germ.;* Cantarelle, *Ital.;* Cantharidas, *Span.*

The term *cantharis* was employed by the ancient Greek writers to designate many coleopterous insects. Linnæus conferred the title upon a genus in which the officinal blistering fly was not included, and placed this insect in the genus *Meloë.* This latter, however, has been divided by subsequent naturalists into several genera. Geoffroy made the Spanish fly the prototype of a new one which he called *Cantharis,* substituting *Cicindela* as the title of the Linnæan genus which he had thus deprived of its original designation. Fabricius made some alteration in the arrangement of Geoffroy, and substituted *Lytta* for *Cantharis* as the generic title. The former was adopted by the London College, and at one time was in extensive use; but the latter having been restored by Latreille, is now recognised in the European and American Pharmacopœias, and is universally employed. By this naturalist the vesicating insects were grouped in a small tribe corresponding very nearly with the Linnæan genus Meloë, and distinguished by the title *Cantharideæ.* This tribe he divided into eleven genera, among which is the Cantharis. Two others of these genera, the *Meloë* properly so called, and the *Mylabris,* have been employed as vesicatories. The *Mylabris cichorii* is thought to be one of the insects described by Pliny and Dioscorides under the name of cantharides; and is to this day employed in Italy, Greece, the Levant, and Egypt: and another species, the *M. pustulata,* is applied to the same purpose in China. The *Meloë proscarabæus* and the *M. majalis* have been occasionally substituted for cantharides in Europe, and the *M. trianthemæ* is used to a considerable extent in the upper provinces of Hindostan. Several species of Cantharis, closely analogous to each other in medical properties, are found in various parts of the world; but the *C. vesicatoria* is the only one recognised by the Pharmacopœias of France and Great Britain. The *C. vittata* has been introduced into that of the United States, and will be noticed under a distinct head. At present we shall confine our observations to the *C. vesicatoria* or common Spanish fly.

CANTHARIS. *Class* Insecta, *Order* Coleoptera, *Linn.; Family* Trachelides, *Tribe* Cantharideæ, *Latreille.*

Gen. Ch. *Tarsi* entire; *nails* bifid; *head* not produced into a rostrum; *elytra* flexible, covering the whole abdomen, linear, semicylindric; *wings* perfect; *maxillæ* with two membranaceous *laciniæ,* the external one acute within, subuncinate; *antennæ* longer than the head and thorax, rectilinear; first joint largest, the second transverse, very short; *maxillary palpi* larger at tip. *Say.*

Cantharis Vesicatoria. Latreille, *Gen. Crust. et Insect. tom.* ii. *p.* 220. This insect is from six to ten lines in length, by two or three in breadth, and of a beautiful shining golden-green colour. The head is large and heart-shaped, bearing two thread-like, black, jointed feelers; the thorax short and quadrilateral; the wing-sheaths long and flexible, covering brownish membranous wings. When alive, the Spanish flies have a strong, penetrating, fetid odour, compared to that of mice, by which swarms of them may be detected at a considerable distance. They attach themselves preferably to certain trees and shrubs, such as the white poplar, privet, ash, elder, and lilac, upon the leaves of which they feed. The countries in which they most abound are Spain, Italy, and the South of France; but they are found to a greater or less extent in all the temperate parts of Europe, and probably also in the West of Asia. In the state of larva, they live in the ground and gnaw the roots of plants. They usually make their appearance in swarms upon the trees in the months of May and June, at which period they are collected. The time preferred for the purpose is in the morning at sun-rise, when they are torpid from the cold of the night, and easily let go their hold. Persons with their faces protected by masks and their hands by gloves, shake the trees, or beat them with poles; and the insects are received as they fall upon linen cloths spread underneath. They are then plunged into vinegar diluted with water, or exposed in sieves to the vapour of boiling vinegar, and having been thus deprived of life, are dried either in the sun, or in apartments heated by stoves. This mode of killing the flies by the steam of vinegar is as ancient as the times of Dioscorides and Pliny. In some places they are gathered by smoking the trees with burning brimstone. When perfectly dry, they are introduced into casks or boxes, lined with paper and carefully closed, so as to exclude as much as possible the atmospheric moisture.

Cantharides come chiefly from Spain, Italy, and other parts of the Mediterranean. Considerable quantities are also brought from St. Petersburg, derived originally, in all probability, from the southern provinces of Russia. Dr. A. T. Thomson states that they are imported into England "chiefly from Astracan, packed in casks and small chests." They are sometimes mixed with considerable quantities of the *Melolontha vitis*, which, as it is destitute of vesicatory properties, should be separated from the genuine flies. This insect is distinguishable by its almost square form, and by its black feet.

Properties. Dried Spanish flies preserve the form and colour, and, to a certain extent, the disagreeable odour of the living insect. They have an acrid, burning, and urinous taste. Their powder is of a grayish-brown colour, interspersed with shining particles, which are the fragments of the feet, head, and wing-cases. If kept perfectly dry, in well-stopped glass bottles, they will retain their activity for a great length of time. A portion which had been preserved by Van-Swieten for thirty years in a glass vessel, was found still to possess vesicating properties. But exposed to a damp air, they quickly undergo putrefaction; and this change takes place most speedily in the powder; hence the insects should always be kept whole, and powdered only as they are wanted for use. They should never be purchased in powder, as, independently of the consideration just mentioned, they may in this state be more easily adulterated. But, however carefully managed, cantharides are apt to be attacked by mites, which feed on the interior soft parts of the body, reducing them to powder, while the harder exterior parts are not affected. An idea was at one time prevalent, that the vesicating property of the insect was not injured by the worm, which was supposed to devour only the inactive portion. But this has been proved to be a mistake. M. Farines, an apothecary of Perpignan, has satisfactorily shown, that though the hard parts left by these mites possess some vesicating power, and the powder produced by them still more, yet the sound flies are much stronger than either. Camphor, which has been recommended as a preservative, does not prevent the destructive agency of the worm.* It is also stated by M. Farines, that when the flies are destroyed by the vapour of pyroligneous acid instead of common vinegar, they acquire an odour which contributes to their preservation. Cantharides will bear a very considerable heat without losing the brilliant colour of their elytra; nor is this colour extracted by water, alcohol, ether, or the oils; so that the powder might be deprived of all its active principles, and yet retain the exterior characters unaltered.

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* It appears from the experiments of M. Nivet, that though camphor does not preserve the entire fly from the attacks of the larvæ of the *Anthrenus*, it actually destroys the mites of the Cantharis so often found in the powder, and may, therefore, be introduced with advantage, in small lumps, into bottles containing powdered cantharides. *Journ. de Pharm.* xix. 604.

So early as 1778, Thouvenel attempted to analyze cantharides, and the attempt was repeated by Dr. Beaupoil in 1803; but no very interesting or valuable result was obtained till the year 1810, when Robiquet discovered in them a crystalline substance, which appears to be the vesicating principle of the insect, and to which Dr. Thomson has given the name of *cantharidin.* The constituents, according to Robiquet, are, 1. a green oil, insoluble in water, soluble in alcohol, and inert as a vesicatory; 2. a black matter, soluble in water, insoluble in alcohol, and inert; 3. a yellow viscid matter, soluble in water and alcohol, and without vesicating powers; 4. *cantharidin;* 5. a fat matter insoluble in alcohol; 6. phosphates of lime and of magnesia, acetic acid, and in the fresh insect a small quantity of uric acid. Orfila has since discovered a volatile principle, upon which the fetid odour of the fly depends. It is separable by distillation with water. *Cantharidin* is a white substance in the form of crystalline scales, of a shining micaceous appearance, insoluble in water and cold alcohol; but soluble in ether, the oils, and in boiling alcohol which deposites it upon cooling. It is obtained by submitting the watery extract of cantharides to the action of boiling alcohol, which extracts the yellow matter and the cantharidin. The alcoholic solution is evaporated, and the residue treated repeatedly with sulphuric ether, which dissolves the cantharidin with a small quantity of the yellow matter, and deposites them when allowed to evaporate spontaneously. The yellow matter is separated by cold alcohol; and the cantharidin being thus left pure, is dried between folds of bibulous paper.* Notwithstanding the insolubility of this principle in water and cold alcohol, the decoction and tincture of cantharides have the peculiar medicinal properties of the insect; and Lewis ascertained that both the aqueous and alcoholic extracts acted as effectually in exciting vesication as the flies themselves, while the residue was in each case inert. The cantharidin consequently exists in the insect so combined with the yellow matter as to be rendered soluble in water and cold alcohol.

Medical Properties and Uses. Internally administered, cantharides are a powerful stimulant, exercising a peculiar influence over the urinary and genital organs. In moderate doses, this medicine sometimes acts as a diuretic, and generally excites some irritation in the urinary passages, which, if its use be persevered in, or the dose increased, often amounts to violent strangury, attended with excruciating pain, and the discharge of bloody urine. In still larger quantities, it produces, in addition to these effects, obstinate and painful priapism, vomiting, bloody stools, severe pains in the whole abdominal region, with a fetid cadaverous breath, hurried respiration, a hard and frequent pulse, burning thirst, sometimes a dread of liquids, frightful convulsions, tetanus, delirium, and death. Dissection reveals inflammation and ulceration of the mucous coat of the whole intestinal canal. Notwithstanding their exceeding violence, cantharides have been long and beneficially used in medicine. They appear to have been given by Hippocrates in cases of dropsy and amenorrhœa, in the latter of which complaints, when properly prescribed, they are a highly valuable remedy. In dropsy they sometimes prove beneficial when the system is in an atonic condition, and the vessels of the kidneys feeble. Dr. Ferriar considers them peculiarly useful in the anasarcous swellings which occasionally succeed scarlet fever. They are also useful in obstinate gleet, leucorrhœa, and seminal weakness; and afford one of the most certain means of relief in incontinence of urine arising from debility or partial paralysis of the sphincter of the bladder. A case of diabetes is recorded in the N. Am. Archives, (vol.ii. p. 175,) in whicha cure was effected under the use of tincture of cantharides. Their unpleasant effects upon the urinary passages are best obviated by the free use of diluent drinks; and, when not consequent upon great abuse of the medicine, may almost always be relieved by an anodyne injection composed of laudanum with a small quantity of mucilaginous fluid. The dose of Spanish flies is one or two grains of the powder, which may be given twice a day in the form of pill. The tincture, however, is more frequently employed.

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* In the *Journal de Pharmacie* for January, 1835, a much simpler and more productive method of obtaining cantharidin is described by M. Thierry. It consists in macerating powdered flies in ether for several days; introducing the mixture into an apparatus for filtering by displacement; adding, after the liquid has ceased to flow out, fresh portions of ether, till it comes away nearly colourless; displacing the whole of the menstruum still remaining in the mass by pouring water upon it; distilling the filtered liquor so as to recover the ether; then allowing the residue to cool; and finally purifying the cantharidin which is deposited, by treating it with boiling alcohol and animal charcoal. Alcohol of 34°, or a mixture of alcohol and ether, may be substituted for the ether itself; but the last mentioned fluid is preferable, as it dissolves less of the green oil, the separation of which from the cantharidin is the most difficult part of the process. M. Thierry obtained from 1000 parts of powdered flies, 4 parts of pure cantharidin.

Externally applied, cantharides excite inflammation in the skin, which terminates in a copious secretion of serum under the cuticle. Even thus applied, they not unfrequently give rise to strangury or tenesmus; and this in fact is one of the most troublesome attendants upon their operation. It probably results from the absorption of the active principle of the fly; and is not prevented by any of the various modes of combination in which the epispastic substance has been applied. Camphor given internally, or mixed with the flies previously to their application, was at one time in much repute as a preventive of strangury; but has lost its credit. The most certain method of obviating this unpleasant effect, is to allow the epispastic application to continue no longer than is necessary to its full rubefacient operation; and afterwards to favour vesication by the use of an emollient poultice. (See *Ceratum Cantharidis.*)

The blistering fly may be employed either as a rubefacient, or with a view to the production of a blister. In the former capacity it is seldom used, except in low states of disease, where external stimulation is required to support the system; but as an epispastic, it is preferred to all other substances, and in the extent of its employment is surpassed by few articles of the materia medica.

Blisters are calculated to answer numerous indications. Their local effect is attended with a general excitement of the system, which renders them valuable auxiliaries to internal stimulants in low or typhoid conditions of disease; and they may sometimes be safely resorted to with this view when the latter remedies are inadmissible. The powerful impression they make on the system is sufficient in many instances to subvert morbid associations, and thus to allow the re-establishment of healthy action. Hence their application to the cure of remittent and intermittent fevers, in which they often prove effectual, when so employed as to be in full operation at the period for the recurrence of the paroxysm. On the principle of revulsion, they prove useful in a vast variety of complaints. Drawing both the nervous energy and the circulating fluid to the seat of their own immediate action, they relieve irritations and inflammations of internal parts; and are employed for this purpose in every disease attended with these derangements. In such cases, however, arterial excitement should always be reduced by direct depletion before the remedy is resorted to. Blisters are also capable of substituting their own action for one of a morbid nature existing in the part to which they are directly applied. Hence their use in tinea capitis, obstinate herpes, and various cutaneous eruptions. Their local stimulation renders them useful in some cases of threatened gangrene, and in partial paralysis. From the serous discharge they occasion, much good results in erysipelas and various other local inflammations, in the immediate vicinity of which their action can be established; and the effects of an issue may be obtained by the continued application of irritants to the blistered surface. Perhaps the pain produced by blisters may be useful in some cases of nervous excitement or derangement, in which it is desirable to withdraw the attention of the patient from subjects of agitating reflection. On some constitutions they produce a poisonous impression, attended with frequent pulse, dryness of the mouth and fauces, heat of skin, subsultus tendinum, and even convulsions; and some physicians have been so much alarmed by the occasional occurrence of these symptoms as to induce them to employ the remedy with great hesitation. What is the precise condition of system in which these effects result, it is impossible to determine. They probably arise from the absorption of the active principle of cantharides; and depend on idiosyncrasies of constitution, by which the system of certain individuals is susceptible of impressions different from those usually produced by the same cause. In this respect the Spanish flies are analogous to mercury; and any argument drawn from this source against the use of the one would equally apply to the other. The general good which results from their use far overbalances any partial and uncertain evil. For some rules relative to the application of blisters, the reader is referred to the *Ceratum Cantharidis.*

Off. Prep. Ceratum Cantharidis, *U.S.;* Cerat. Cantharidis, *Lond.;* Emplastrum Cantharidis, *Lond., Ed., Dub.;* Emplast. Cantharidis Vesicatoriæ Comp., *Ed.;* Linimentum Cantharidis, *U.S.;* Tinctura Cantharidis, *U.S., Lond., Ed., Dub.;* Unguent. Cantharidis, *U.S., Lond., Dub.;* Unguent. Infusi Cantharidis Vesicatoriæ, *Ed.;* Unguent. Pulv. Canth. Vesicat. *Ed.*

W.

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CANTHARIS VITTATA. *U.S.*

Potato Flies.

"Cantharis vittata, *Olivier;* Lytta vittata, *Fabricius.*" *U. S.*

Within the limits of the United States are several species of Cantharis, which have been employed as substitutes for the C. vesicatoria, and found to be equally efficient. Of these only the *C. vittata* has been adopted as officinal; but as others may be more abundant in particular districts, or in certain seasons, and are not inferior in vesicating powers, we shall briefly notice all which have been submitted to experiment.

1. *Catharis vittata.* Latreille, *Gen. Crust. et Insect.;* Durand, *Journ. of the Phil. Col. of Pharm.* ii. 274. fig. 4. The *potato fly* is rather smaller than the *C. vesicatoria*, which it resembles in shape. Its length is about six lines. The head is of a light red colour, with dark spots upon the top; the feelers are black; the elytra or wing cases are black, with a yellow longitudinal stripe in the centre, and with a yellow margin; the thorax is also black, with three yellow lines; and the abdomen and legs, which have the same colour, are covered with a cinereous down. It inhabits chiefly the potato vine, and makes its appearance about the end of July or beginning of August, in some seasons, in great abundance. It is found on the plant in

the morning and evening; but during the heat of the day descends into the soil. The insects are collected by shaking them from the plant into hot water; and are afterwards carefully dried in the sun. They are natives of the Middle and Southern States.

This species of Cantharis was first described by Fabricius in the year 1781; and was introduced to the notice of the profession by Dr. Isaac Chapman of Bucks county, Pennsylvania, who found it equal if not superior to the Spanish fly as a vesicatory. The testimony of Dr. Chapman has been corroborated by that of many other practitioners, some of whom have even gone so far as to assert, that the potato fly is not attended in its action with the inconvenience of producing strangury. But this statement has been ascertained to be incorrect; and as the vesicating property of all these insects probably depends upon the same proximate principle, their operation may be considered as identical in other respects. If the potato fly has been found more speedy in its effects than the Cantharis of Spain, the result is perhaps attributable to the greater freshness of the former. It may be applied to the same purposes, treated in the same manner, and given in the same dose as the foreign insect.

2. *Cantharis cinerea.* Latreille, *Gen. Crust. et Insect.;* Durand, *Journ. of the Phil. Col. of Pharm.* ii. 274. fig. 5. The *ash-coloured cantharis* closely resembles the preceding species in figure and size; but differs from it in colour. The elytra and body are black, without the yellow stripes that characterize the C. vittata, and are entirely covered with a short and dense ash-coloured down, which conceals the proper colour of the insect. The feelers are black, and the first and second joints are very large in the male. This species also inhabits the potato-vine, and is occasionally found on other plants, as the English bean and wild indigo. It is a native of the Northern and Middle States. All the remarks before made upon the potato fly, as to the mode of collection, properties, and medical use, apply equally well to that at present under consideration. Illiger in 1801 first discovered its vesicating properties; but to Dr. Gorham is due the credit of calling public attention particularly to the subject, in a communication addressed, in the year 1808, to the Medical Society of Massachusetts. This species is often confounded with the *C. vittata.*

3. *Cantharis marginata.* Latreille, *Gen. Crust. et Insect.;* Durand, *Journ. of the Phil. Col. of Pharm.* ii. 274. fig. 6. This is somewhat larger than the *C. vittata,* and of a different shape. The elytra are black, with the suture and margin ash-coloured. The head, thorax, and abdomen are black, but nearly covered with an ash-coloured down; and on the upper part of the abdomen, under the wings, are two longitudinal lines of a bright clay colour. This species is usually found, in the latter part of summer, upon the different plants belonging to the genus *Clematis,* and frequents especially the lower branches which trail along the ground. Professor Woodhouse of Philadelphia first ascertained the vesicating properties of this insect; but it had previously been described by Fabricius as a native of the Cape of Good Hope. Dr. Harris, of Massachusetts, found it equally efficient as a vesicatory with any other species of this genus.

4. *Cantharis atrata.* Latreille, *Gen. Crust. et Insect.;* Durand, *Journ. of the Phil. Col. of Pharm.* ii. 274. fig. 7. The *black cantharis* is smaller than the indigenous species already described; but resembles the *C. marginata* in figure. Its length is only four or five lines. It is distinguished by its size, and by its uniform black colour. It frequents more especially the different species of *Aster* and *Solidago,* though it is found also on the *Prunella vulgaris, Ambrosia trifida,* and some other plants. Mr. Durand met

with considerable numbers of this insect in the neighbourhood of Philadelphia in the month of September, and they continued to appear till the middle of October. They are common in the Northern and Middle States, but are not confined exclusively to this country, being found also in Barbary. Drs. Oswood and Harris of New-England have experimented with them, and satisfactorily ascertained their vesicating powers. They are probably identical with the insect noticed as vesicatory by Professor Woodhouse, under the name of *Meloë niger*.

Several other species have been discovered in the United States, but not yet practically employed. Among these are the *C. æneas*, a native of Pennsylvania, discovered by Mr. Say; the *C. politus* and *C. aszelianus*, which inhabit the Southern States; the *C. Nuttalli*, a large and beautiful insect of Missouri, first noticed by Mr. Nuttall, and said to surpass the Spanish fly in magnitude and splendour; and the *C. albida*, another large species, found by Mr. Say near the Rocky Mountains. Of these, the *C Nuttalli** bids fair, at some future period, to be an object of some importance in the western section of this country. The head is of a deep greenish colour, with a red spot in front; the thorax is of a golden green; the elytra, red or golden purple and somewhat rugose on their outer surface, green and polished beneath; the feet, black; the thighs, blue or purplish. The exploring party under Major Long ascertained the vesicating powers of this insect. It was found in the plains of the Missouri, feeding on a scanty grass, which it sometimes covered to a considerable extent. In one place it was so numerous and troublesome, as to be swept away by bushels, in order that a place might be cleared for encamping. W.

CAPSICUM. *U.S.*

Cayenne Pepper.

"Capsicum annuum. Fructus. *The fruit.*" *U.S.*

Off. Syn. CAPSICI BACCÆ. Capsicum annuum. Baccæ. *Lond.;* CAPSICI ANNUI FRUCTUS. *Ed.;* CAPSICUM ANNUUM. Capsulæ cum seminibus. *Dub.*

Poivre de Guinée, Poivre d'Inde, *Fr.;* Spanischer Pfeffer, *Germ.;* Pepperone, *Ital.;* Pimiento, *Span.*

Capsicum. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Solaneæ.

Gen. Ch. Corolla wheel-shaped. *Berry* without juice. *Willd.*

Numerous species of Capsicum, inhabiting the East Indies and tropical America, are enumerated by botanists, the fruit of which, differing simply in the degree of pungency, may be indiscriminately employed. The *C. baccatum* or bird pepper, and the *C. frutescens* are said to yield most of the Cayenne pepper brought from the West Indies and South America; and Ainslie informs us that the latter is chiefly employed in the East Indies. The species most extensively cultivated in Europe and this country, is that recognised as officinal by the Pharmacopœias; namely, the *C. annuum.* The first two are shrubby plants, the last is annual and herbaceous.

Capsicum annuum. Willd. *Sp. Plant.* i. 1050; Woodv. *Med. Bot.* p. 226. t. 80. The stem of the annual capsicum is thick, roundish, smooth, and branching; rises two or three feet in height; and supports ovate, pointed,

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* *Lytta Nuttalli*, Say, Amer. Entomol. vol. i. fig. 3.

smooth, entire leaves, which are placed without regular order on long footstalks. The flowers are solitary, white, and stand on long peduncles at the axils of the leaves. The calyx is persistent, tubular, and five-cleft; the corolla, monopetalous and wheel-shaped, with the limb divided into five spreading, pointed, and plaited segments; the filaments, short, tapering, and furnished with oblong anthers; the germen, ovate, supporting a slender style which is longer than the filaments, and terminates in a blunt stigma. The fruit is a pendulous, pod-like berry, light, smooth and shinning, of a bright scarlet, orange, or sometimes yellow colour, with two or three cells, containing a dry loose pulp, and numerous flat, kidney-shaped, whitish seeds.

The plant is a native of the warmer regions of Asia and America, and is cultivated in almost all parts of the world. It is abundantly produced in this country, both for culinary and medicinal purposes. The flowers appear in July and August, and the fruit ripens in October. Several varieties are cultivated in our gardens, differing in the shape of the fruit. The most abundant is probably that with a large irregularly ovate berry, depressed at the extremity, which is much used in the green state for pickling. The medicinal variety is that with long, conical, generally pointed, recurved fruit, usually not thicker than the finger. Sometimes we meet with small, spherical, slightly compressed berries, not greatly exceeding a large cherry in size. When perfectly ripe and dry, the fruit is ground into powder, and brought into market under the name of red or Cayenne pepper. Our markets are also partly supplied by importation from the West Indies. A variety of capsicum, consisting of very small conical, exceedingly pungent berries, has recently been imported from Liberia.

Powdered capsicum is usually of a more or less bright red colour, which fades upon exposure to light, and ultimately disappears. The odour is peculiar and somewhat aromatic, stronger in the recent than in the dried fruit. The taste is bitterish, acrid, and burning, producing a fiery sensation in the mouth, which continues for a long time. The pungency appears to depend on a peculiar principle, which was obtained, though probably not in a perfectly isolated state, by Braconnot, and named *capsicin*. The fruit, freed from the seeds, was submitted to the action of alcohol, and the resulting tincture evaporated. During the evaporation a red-coloured wax separated, and the residuary liquor by further evaporation afforded an extract, from which ether dissolved the capsicin. This was obtained by evaporating the ether. It resembles an oil or soft resin, is of a yellowish-brown or reddish-brown colour, and when tasted, though at first balsamic, soon produces an insupportably hot and pungent impression over the whole interior of the mouth. Exposed to heat it melts, and at a higher temperature, emits fumes which, even in very small quantity, excite coughing and sneezing. It is slightly soluble in water and vinegar, and very soluble in alcohol, ether, oil of turpentine, and the caustic alkalies, which it renders reddish-brown. It constitutes, according to Braconnot, 1.9 per cent. of the pods. The other ingredients, as ascertained by the same chemist, are colouring matter, an azotized substance, gum, pectic acid (probably pectin), and saline matters. Duncan states that the active principle of capsicum is precipitated by infusion of galls, nitrate and muriate of mercury, nitrate of silver, sulphate of copper, sulphate of zinc, persulphate of iron, ammonia, carbonate of potassa, and alum. Precipitates may be produced with the infusion of capsicum by these substances; but it is by no means certain that they all throw down the active principle. It is said that the red oxide of lead is sometimes added to the powdered capsicum sold in Europe. It may be detected by digesting the suspected powder in diluted nitric acid, filtering, and adding a solution of sulphate of soda, which will throw down a white precipitate if there be any oxide of lead present.

Medical Properties and Uses. Cayenne pepper is a powerful stimulant, producing when swallowed a sense of heat in the stomach, and a general glow over the body, without any narcotic effect. Its influence over the circulation, though considerable, is not in proportion to its local action. It is much employed as a condiment, and proves highly useful in correcting the flatulent tendency of certain vegetables, and bringing them within the digestive powers of the stomach. Hence the advantage derived from it by the natives of tropical climates who live chiefly on vegetable food. In the East Indies it has been used from time immemorial. From a passage in the works of Pliny, it appears to have been known to the Romans. As a medicine it is useful in cases of enfeebled and lanquid stomach; and is occasionally prescribed in dyspepsia and atonic gout, particularly when attended with much flatulence, or occurring in persons of intemperate habits. It has also been given as a stimulant in palsy and certain lethargic affections. To the sulphate of quinia it forms an excellent addition in some cases of intermittents, in which there is great want of gastric susceptibility. It acts by exciting the stomach, and rendering it sensible to the influence of the tonic. Upon the same principle it may prove useful in low forms of fever as an adjuvant to tonic or stimulant medicines. Its most important application, however, is to the treatment of malignant sore throat and scarlet fever, in which it is used both internally and as a gargle. No other remedy has obtained equal credit in these complaints. The following formula was employed in malignant scarlatina with great advantage in the West Indies, where this application of the remedy originated. Two tablespoonfuls of the powdered pepper with a teaspoonful of common salt are infused for an hour in a pint of a boiling liquid, composed of equal parts of water and vinegar. This is strained when cool through a fine linen cloth, and given in the dose of a tablespoonful every half hour. The same preparation is also used as a gargle. It is, however, only to the worst cases that the remedy is applied so energetically. In milder cases of scarlatina with inflamed or ulcerated throat, much relief and positive advantage often follow the employment of the pepper in a more diluted state.

Applied externally, capsicum is a powerful rubefacient, very useful in local rheumatism, and in low forms of disease, where a stimulant impression upon the surface is demanded. It has the advantage, under these circumstances, of acting speedily without endangering vesication. It may be applied in the form of cataplasm, or more conveniently and efficiently as a lotion mixed with heated spirit. The powder or tincture, brought into contact with a relaxed uvula, often acts very beneficially.

The dose of the powder is from five to ten grains, which may be most conveniently given in the form of pill. Of an infusion prepared by adding two drachms to half a pint of boiling water, the dose is about half a fluidounce. A gargle may be prepared by infusing half a drachm of the powder in a pint of boiling water, or adding half a fluidounce of the tincture to eight fluidounces of rose-water.

Off. Prep. Tinctura Capsici, *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

CARBO.

Carbon.

Pure charcoal; Carbone, *Fr., Ital.;* Kohlenstoff, *Germ.;* Carbon, *Span.*

Carbon is an elementary combustible substance of great importance, and very extensively diffused in nature. It exists in large quantity, under various forms and in different states of combination, in the mineral kingdom; and it forms the most abundant constituent of animal and vegetable matter. In a state of perfect purity and crystallized, it constitutes the diamond, and more or less pure, it forms the substances known under the names of *plumbago* or *black lead*, *anthracite*, *bituminous coal*, *coke*, *animal charcoal*, and *vegetable charcoal.* Combined with oxygen, it constitutes *carbonic acid*, which is an invariable constituent of the atmosphere, and is present in many natural waters, especially those which have an effervescing quality. United with oxygen and a base, it forms the carbonates, and of course *carbonate of lime*, which is one of the most abundant combinations of the mineral kingdom.

The *diamond*, or crystallized carbon, is found principally in India and Brazil. It is perfectly transparent, and is the hardest and most brilliant substance in nature. On account of these properties, as well as its great rarity and durability, it is exceedingly precious. Its sp. gr. is about 3.5. It is perfectly fixed and unalterable in the fire, provided air be completely excluded; but it is combustible in air or oxygen, the product being the same as when charcoal is burnt, namely carbonic acid.

Next to diamond, plumbago and anthracite are the purest natural forms of carbon. Plumbago is the substance of which black lead crucibles and pencils are made. It is found in greatest purity, perhaps, in the mine of Borrowdale, in England; but it also occurs very pure in this country, especially near Bustleton in Pennsylvania. It was formerly supposed to be a carburet of iron; but in very pure specimens it is nearly free from iron, which must, therefore, be deemed merely an accidental impurity. Anthracite is a pretty abundant form of mineral carbon. It occurs in different parts of the world, but particularly in the United States. Immense beds of it exist in the interior of Pennsylvania, in Rhode Island, and on the banks of the Arkansas. Bituminous coal is a form of the carbonaceous principle, in which the carbon is associated with volatile matter of a bituminous nature. When this is driven off by the process of charring, a kind of mineral charcoal called coke is obtained, very useful in the arts as a fuel.

Carbon may be obtained artificially, in a state approaching to purity, by several processes. One method is to expose lampblack to a full red heat in a close vessel. It may also be obtained in a very pure state by passing the vapour of volatile oils through an ignited porcelain tube, whereby the hydrogen and oxygen of the oil will be dissipated, and the charcoal left in the tube. A very pure charcoal is procured by exposing sugar, or other vegetable substances which leave no ashes when burnt, to ignition in close vessels.

Properties. Carbon in its crystallized form has already been described as diamond. In its uncrystallized state it is an insoluble, infusible* solid, generally of a black colour, and without taste or smell. It is combustible, and when sufficiently heated unites with the oxygen of the air, and generates a gaseous acid, called carbonic acid. Its sp. gr. in the solid state, apart from the pores which it contains when in mass, is 3.5; but with the pores included, it is only 0.44. In a state of vapour, its density is 0.4215, as obtained by calculation. It is a very unalterable and indestructible substance, and has great power to resist and correct putrefaction in other bodies. When in a state of extreme division, it possesses the remarkable property of destroying the colouring and odorous principles of most liquids. The conditions, under which this property is most powerfully developed, will be explained under the head of animal charcoal. (See *Carbo Animalis.*) Its other physical properties differ according to its source and peculiar state of aggregation. Its equivalent number is 6.12. As a chemical element, it enjoys a very extensive range of combination. It combines in five proportions with oxygen, forming carbonic oxide, and carbonic, oxalic, mellitic, and croconic acids. (See *Aqua Acidi Carbonici*, and *Oxalic Acid.*) It unites also with chlorine, iodine, and bromine. With hydrogen it forms many combinations, amongst which the most interesting and best known are light carburetted hydrogen or fire-damp, and olefiant gas. With nitrogen it constitutes cyanogen, the compound radical of hydrocyanic or prussic acid; and united with iron in minute proportion it forms steel. It is thus perceived, that as a chemical agent it performs a most important part in the economy of nature.

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* Professor Silliman, however, is of opinion that it is fusible when subjected to the intense ignition produced by the galvanic deflagrator of Dr. Hare; and Dr. Colquhoun

To notice all the forms of the carbonaceous principle would be out of place in this work. We shall, therefore, restrict ourselves to the consideration of those which are officinal, namely, *animal charcoal*, and common *wood charcoal;* and these will be described in the two following articles.

B.

CARBO ANIMALIS. *U.S.*

Animal Charcoal.

Charbon animal, *Fr.;* Thierische Kohle, *Germ.;* Carbone animale, *Ital.;* Carbon animal, *Span.*

By animal charcoal, in the United States Pharmacopœia, is meant that form of the carbonaceous principle which is obtained from animal substances, and possesses the property of removing colouring matters from solutions. All kinds of animal charcoal do not necessarily possess the decolorizing property, and hence would not be applicable to pharmaceutical purposes. This substance is not officinal in the British Pharmacopœias.

The kind of animal charcoal usually employed in pharmacy and the arts, is obtained from bones, by subjecting them to a red heat in close vessels. The residue of the ignition is a black matter, which when reduced to powder forms the substance properly called *bone-black*, but familiarly known under the incorrect name of *ivory-black.* Ivory by carbonization will furnish a black, which, on account of its fineness and intensely black colour, is more esteemed than the ordinary bone-black; but it is much more expensive.

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inclines to the opinion that the perfectly pure charcoal deposited from coal gas has undergone fusion.

Animal charcoal, in the form of bone-black, is almost exclusively prepared by the makers of ammoniacal products. Bones are by these manufacturers subjected to destructive distillation in iron retorts or cylinders, and after all the ammoniacal products have come over, the residuum is charred bone, or bone-black. The bone consists of animal matter with phosphate and carbonate of lime. In consequence of a new arrangement of the elements of the animal matter, the hydrogen and nitrogen united as ammonia, and a part of the charcoal as carbonic acid, distil over; while the remainder of the charcoal is left in the retort, intermingled with the calcareous salts. In this form, therefore, of animal charcoal, the carbon is evidently mixed with phosphate and carbonate of lime, and the same is the case with the true ivory-black.

Properties. Animal charcoal, in the form of bone-black, (called ivory-black in the shops,) is a black powder, possessing a slightly alkaline and bitterish taste, and having a general resemblance to powdered vegetable charcoal. It is, however, more dense and less combustible than this charcoal, from which, moreover, it may be distinguished by burning a small portion of it on a red-hot iron, when it will leave a residuum but imperfectly acted on by sulphuric acid; whereas the ashes from vegetable charcoal will readily dissolve in this acid, and form a bitterish solution.

Animal charcoal by no means necessarily possesses the decolorizing property; as this depends upon its peculiar state of aggregation. If a piece of pure animal matter be carbonized, it usually enters into fusion, and from the gaseous matter which is extricated, becomes porous and cellular. The charcoal formed has generally a metallic lustre, and a colour resembling that of black lead. It has, however, little or no decolorizing power, even though it may be finely pulverized.

Pharmaceutical and Economical Uses. Animal charcoal is used in pharmacy for the most part to decolorize vegetable principles, such as quinia, morphia, &c., and in the arts, principally for the purpose of clarifying syrups in sugar refining, and of depriving spirits distilled from grain of the peculiar volatile oil, which imparts to them an unpleasant taste as first distilled. The only formula in which it is used in the United States Pharmacopœia, is that for the preparation of sulphate of quinia. The manner in which it is used is to mix it with the substance to be decolorized, and to allow the mixture to stand for some time. The charcoal unites chemically with the colouring matter, and the solution by filtration is obtained white and transparent. For nice decolorizing operations, the animal charcoal, if bone-black, must be digested in muriatic acid in order to free it from phosphate and carbonate of lime.

Rationale of the effects of Charcoal as a Decolorizing Agent. Under this head we shall speak generally of the conditions necessary to constitute charcoal a decolorizing agent; by which it will more clearly appear why certain animal charcoals possess this property. The decolorizing power of charcoal was first noticed by Lowitz of St. Petersburg; and the subject was subsequently ably investigated by Bussy, Payen, and Desfosses. It is generally communicated to charcoal by igniting it in close vessels, but not always. The kind of charcoal, for example, obtained from substances which undergo fusion during carbonization, does not possess the property, even though it may be afterwards finely pulverized by mechanical means. The property in question is possessed to a certain extent by wood charcoal; but is developed in it in a much greater degree by burning it with some chemical substance, which may have the effect of reducing it to an extreme degree of fineness. The most powerful of all the charcoals for discharging colours, are those obtained from certain animal matters, such as dried blood, hair, horns, hoofs, &c. by first carbonizing them in connexion with carbonate of potassa, and then washing the product with water. Charcoal thus prepared seems to be reduced to its finest possible particles. The next most powerful decolorizing charcoal is *ivory* or *bone-black*, in which the separation of the carbonaceous particles is effected by the phosphate of lime present in the bone. Vegetable substances also may be made to yield a good charcoal for destroying colour, provided before carbonization, they be well comminuted, and mixed with pumice stone, chalk, flint, calcined bones, or other similar substance in a pulverized state.

It results from the foregoing facts, that the decolorizing power of charcoal depends upon a peculiar mode of aggregation of its particles, the leading character of which is that they are isolated, as it were, from one another, and thus enabled to present a greater extent of surface. It is on this principle that certain chemical substances act in developing the property in question, when they are ignited in a state of intimate mixture with the substance to be charred. Thus it is perceived that there is no necessary connexion between animal charcoal and the decolorizing power; as this charcoal may or may not possess the peculiar aggregation of its particles on which the power depends. Bone-black, for instance, has this property, not because it is an animal charcoal; but because, in consequence of the phosphate of lime present in the bone, the favourable state of aggregation is induced. Of all the substances yet tried to insulate the carbonaceous molecules, carbonate of potassa appears to be the best.

Charcoal which has been used for decolorizing, loses its peculiar property, which cannot be restored by a fresh ignition, unless it be previously mixed with some inorganic substance. The best substance for this purpose is carbonate of potassa, which, after the ignition, must be washed away from the charcoal.

The following table, abridged from one drawn up by Bussy, denotes the decolorizing power of different charcoals, compared with the effect of bone-black taken as unity.

KINDS OF CHARCOAL.	*Decolorizing Power relative to Syrup.*	*Decolorizing Power relative to Indigo.*
Bone-black, - - - - - - - - - - - - -	1	1
Bone charcoal treated by an acid, - - - - - - - -	1.6	1.87
Oil ignited with phosphate of lime, - - - - - - -	1.9	2
Lampblack, not ignited, - - - - - - - - - -	3.3	4
Charcoal from acetate of potassa, - - - - - - - -	4.4	5.6
Gluten ignited with the carbonate of potassa, - - - - -	8.8	10.6
Blood ignited with phosphate of lime, - - - - - - -	10	12
Lampblack ignited with the carbonate of potassa, - - - -	10.6	12.2
Blood ignited with chalk, - - - - - - - - - - -	11	18
White of egg ignited with carbonate of potassa, - - - -	15.5	34
Glue ignited with carbonate of potassa, - - - - - - -	15.5	36
Bone charcoal, formed by depriving the bone of phosphate of lime by an acid, and ignition with potassa, - - - - - - -	20	45
Blood ignited with carbonate of potassa, - - - - - - -	20	50

Comparing the extremes of this table, it is perceived that blood ignited with carbonate of potassa is twenty times more powerful in discharging the colour of syrup, and fifty times more powerful in decolorizing indigo, than an equal weight of bone-black. This is certainly a great disparity in effect, and could hardly have been anticipated. B.

CARBO LIGNI. *U.S., Lond., Ed., Dub.*

Charcoal.

Charbon de bois, *Fr.;* Holzkohle, *Germ.;* Carbone di legno, *Ital.;* Carbon de lena, *Span.*

Preparation on the Large Scale. Common charcoal is prepared in the following manner. Billets of wood are piled in a conical heap, and covered with earth and sod to prevent the access of air; several holes being left at the bottom, and one at the top of the heap, in order to produce a draught to commence the combustion. The wood is then kindled from the bottom. In a little while, the hole at the top is closed, and after the ignition has been found to pervade the whole heap, those at the bottom are stopped also. The combustion taking place with a smothered flame and limited access of air, the volatile portions of the wood, consisting of hydrogen and oxygen, are dissipated, while the carbon, in the form of charcoal, is left behind.

In this process for the carbonization of wood, all the volatile products are lost; and a portion of the charcoal itself is dissipated by combustion. Wood thus carbonized, yields not more than 17 or 18 per cent. of charcoal. A better method is to char the wood in iron cylinders, when it yields from 22 to 23 parts in the 100 of excellent charcoal; and at the same time, the means are afforded for collecting the volatile products, consisting of pyroligneous acid, empyreumatic oil, and tar. This process for obtaining charcoal has been described under another head. (See *Acidum Aceticum Empyreumaticum*, U. S.)

Preparation for Medical Use. Common charcoal is not, perhaps, sufficiently pure for medical exhibition; as all the volatile portions of the wood are not completely expelled. Lowitz directs its purification to be conducted in the following manner. Fill a crucible with ordinary charcoal reduced to fine powder, and lute on a perforated cover. Then expose the whole to a strong red heat, and continue the ignition as long as a blue flame issues from the aperture in the cover. When this ceases, allow the charcoal to cool, and transfer it quickly to bottles, which must be well stopped.

The Paris Codex directs the preparation of charcoal for medical use to be conducted as follows. Take any quantity of thoroughly burnt charcoal, very light, sonorous, and pure, made from the wood of the linden-tree, willow, poplar, or some other of the lighter woods, and moisten it with water. Reduce it to powder in an iron mortar, or by means of a mill; and having mixed it with water to form a thin fluid mass, let it stand for a few days; after which, place it on a linen cloth to drain. Make up the paste into round cakes, and expose them to the rays of the sun until they are thoroughly dried. By this process of insolation, the charcoal is stated in the Codex to be completely deprived of all adventitious colour and smell, and to be singularly improved in efficiency; advantages which are not equally obtained, when it is dried in the shade.

Properties. Charcoal is a black, shining, brittle, porous substance, tasteless and inodorous, and insoluble in water. It is a good conductor of electricity, but a bad one of heat. In masses, it floats in water; but when reduced to a fine powder, whereby its porosity is destroyed, it sinks in that liquid. It possesses the remarkable property of absorbing many times its own bulk of certain gases, provided it be perfectly dry. When exposed to the air after ignition, it increases rapidly in weight, absorbing from twelve to fourteen per cent. of moisture. As ordinarily prepared, it contains the incombustible part of the wood, which would have formed the ashes in its ordinary combustion. These amount to about one-fiftieth of the charcoal, and may be removed by digesting it in diluted muriatic acid, and afterwards washing it thoroughly on a filter with boiling water.

Medical Properties, &c. Powdered charcoal is antiseptic and absorbent. It is employed with advantage in certain forms of dyspepsia, attended with fetid breath and putrid eructations, in doses of about ten grains; and it has been exhibited in dysentery with the effect of correcting the fetor of the stools. It has been recommended as a specific in intermittent fever, and for the purpose of obviating costiveness; but its powers in the former disease are not well established. As a remedy in obstinate constipation, Dr. Daniel of Savannah speaks of it in high terms, and reports fourteen or fifteen cases as occurring in his practice, in which it proved successful. He also found it a useful remedy in the nausea and confined state of the bowels, which usually attend pregnancy. Mixed with crum of bread or linseed meal and water, into the consistence of a cataplasm, it forms a good application to gangrene and ill-conditioned ulcers; and the Dublin College has an officinal preparation of this kind. Mr. Pearson, a distinguished surgeon of London, employed it advantageously as a topical application in traumatic hemorrhage, and states that he believes it to be the basis of Ruspini's styptic. Several of its varieties constitute the best tooth-powder which can be used. Those which are generally preferred are the charcoals of the cocoa-nut shell and of bread. The dose of charcoal varies from ten grains to a drachm or more. Dr. Daniel gave it in his cases, in doses of a tablespoonful repeated every half hour.

In consequence of the absorbent and antiseptic properties of charcoal, it is invaluable in domestic economy. Meat embedded in it in close vessels is kept perfectly sweet for many months; and water intended for long voyages is equally preserved by the addition of its powder. The power of some of its varieties in destroying colours and odours is very considerable; and it acts upon the principle which has been explained under the head of animal charcoal. (See *Carbo Animalis.*)

Off. Prep. Cataplasma Carbonis Ligni, *Dub.* B.

CARDAMINES FLORES. *Lond.*

Cuckoo-flower.

"Cardamine pratensis. *Flores.*" *Lond.*

Off. Syn. CARDAMINES PRATENSIS FLORES. *Ed.;* CARDAMINE PRATENSIS. Flores. *Dub.*

Cresson des prés, *Fr.;* Wiesenkresse, *Germ.;* Kardamine, *Ital.*

CARDAMINE. *Sex. Syst.* Tetradynamia Siliquosa.—*Nat. Ord.* Cruciferæ.

Gen. Ch. Pods opening elastically, with revolute valves. *Stigma* entire. *Calyx* somewhat gaping. *Willd.*

Cardamine pratensis. Willd. *Sp. Plant.* iii. 487; Woodv. *Med. Bot.* p. 398. t. 144. The Cuckoo-flower is a perennial herbaceous plant, with a simple, smooth, erect stem, about a foot in height. The leaves are pinnate; the radical, composed of roundish irregularly toothed leaflets, those of the stem alternate, with leaflets which become narrower, more entire, and pointed as they ascend. The flowers are purplish-white or rose-coloured, and terminate the stem in a raceme approaching the character of a corymb.

This species of Cardamine is a native of Europe, and is found in the northern parts of our continent, about Hudson's Bay. It is a very handsome plant, abounding in moist meadows, which it adorns with its flowers in the months of April and May. The leaves are bitterish and slighly pungent, resembling in some measure those of water-cresses, and like them supposed to be possessed of antiscorbutic properties. In Europe they are sometimes added to salads. The flowers only are officinal. They have the same taste with the leaves, and, when fresh, a somewhat pungent odour. When dried, they become inodorous and nearly insipid.

They formerly possessed the reputation of being diuretic, and since the publication of a paper by Sir George Baker, somewhat more than half a century ago, have been occasionally used as an antispasmodic in various nervous diseases, such as chorea and spasmodic asthma, in which they were successfully employed by that physician. They produce, however, little obvious effect upon the system, and are not employed in this country.

W.

CARDAMOMUM. *U.S.*

Cardamom.

"Matonia Cardamomum. *Roscoe.* Elettaria Cardamomum. *Maton.* Semina. *The seeds.*" *U. S.*

Off. Syn. CARDAMOMI SEMINA. Matonia Cardamomum. Semina. *Lond.;* AMOMI REPENTIS SEMINA. *Ed.;* AMOMUM CARDAMOMUM. Semina. *Dub.*

Petit cardamome, *Fr.;* Kleine Kardamomen, *Germ.;* Cardamomo minore, *Ital.;* Cardamomo menor, *Span.;* Ebil, *Arab.;* Kakeleh seghar, *Persian;* Capalaga, *Malay;* Gujarati elachi, *Hindoost.*

The name *cardamom* has been applied to the aromatic capsules of various Indian plants belonging to the family of the Scitamineæ. Three varieties have long been known under the distinctive titles of lesser, middle, and larger —the *cardamomum minus*, *medium*, and *majus*, of older writers. Of these, the first only is recognised by the Pharmacopœias, or generally kept in the shops. The *middle cardamoms*, which are longer than the *lesser*, but not so thick, are of unknown origin, being considered by some as derived from the same plant with the first variety, by others as identical with the third, and differing in size only in consequence of having been collected at a different stage of maturity. The *larger* greatly exceed the others in dimensions, being sometimes an inch and a half long, by one quarter of an inch in thickness. They are generally ascribed to the *Amomum Cardamomum* of Willdenow, which grows in Malacca, Java, and other Malay islands. We find also described by writers on the materia medica, the *round cardamoms* and the *long cardamoms;* but of these the first may without violence be joined with the *lesser*, and the second with the *larger*. Under the name of *grains of paradise—grana paradisi*—small, brown, angular seeds, of a strong odour, and a pungent, aromatic, peppery taste, are kept in the shops, though not introduced into the catalogues of the Pharmacopœias. They are thought by some to be the seeds of the larger cardamoms separated from the capsule; but are treated as wholly distinct by authors, who refer them to the *Amomum Grana Paradisi* of *Linn.*, growing in Ceylon, Madagascar, and perhaps in Guinea. The following remarks have reference exclusively to the lesser or genuine Malabar cardamoms.

Some confusion has prevailed in relation to the botanical history of the cardamom plant. Linnæus confounded under the name of *Amomum Cardamomum*, two different vegetables—the genuine plant of Malabar, and another growing in Java, and producing larger but much inferior capsules. These were separated by Willdenow, who conferred on the former Sonnerat's title of *Amomum repens*, while he retained the original name for the latter, though not the true cardamom plant. In the tenth vol. of the Linn. Transactions, A.D. 1811, Mr. White, a British Army Surgeon in India, published a very minute description of the Malabar plant, which he had enjoyed frequent opportunities of examining in its native state. From this description, the learned Dr. Maton inferred that the plant, according to Roscoe's arrangement of the Scitamineæ, could not be considered an *Amomum;* and as he was unable to attach it to any other known genus, he proposed to construct a new one, with the name of *Elettaria*, derived from *elettari*, or *ela-tari*, the Malabar name of this vegetable. Sir James Smith afterwards suggested the propriety of naming the new genus *Matonia*, in honour of Dr. Maton; and the latter title having been adopted by Roscoe, has obtained a place in the London and United States Pharmacopœias. This explanation was necessary to account for the discordant nomenclature of the different Colleges. After all, however, it is very doubtful whether the new genus is well founded; and the celebrated Dr. Roxburgh describes the Malabar cardamom plant as an *Alpinia*, with the specific appellation of *A. Cardamomum.* He has been followed by Sprengel, and several other German authorities, and recently by Lindley in England. The only material point in which the plant differs from most of the other Alpiniæ, is that the inflorescence proceeds horizontally from the base of the stem, instead of being terminal. We shall follow the authority of Roxburgh.

ALPINIA. *Sex. Syst.* Monandria Monogynia.—*Nat. Ord.* Scitamineæ.

Gen. Ch. *Corolla* with interior border unilabiate. *Anther* double, naked, (uncrowned). *Capsule* berried, three-celled. *Seeds* a few, or numerous, arilled. *Roxburgh, Asiat. Research.* vol. xi. p. 350.

Alpinia Cardomomum. Roxburgh.—*Elettaria Cardamomum*, Maton.—*Matonia Cardamomum*, Roscoe.—*Amomum Repens*, Sonnerat; Willd. *Sp. Plant.* i. 9.—Figured in *Linn. Trans.* x. 248. The cardamom plant has a tuberous horizontal root, furnished with numerous fibres, and sending up from eight to twenty erect, simple, smooth, green and shining, perennial stems, which rise from six to twelve feet in height, and bear alternate, sheathing leaves. These are from nine inches to two feet long, from one to five inches broad, elliptical-lanceolate, pointed, entire, smooth and dark-green on the upper surface, glossy and pale sea-green beneath, with strong midribs, and short footstalks. The scape or flowerstalk proceeds from the base of the stem, and lies upon the ground, with the flowers arranged in the form of a panicle. The calyx is monophyllous, tubular, and toothed at the margin; the corolla monophyllous and funnel-shaped, with the inferior border unilabiate, three-lobed, and spurred at the base. The fruit is a three-celled capsule, containing numerous seeds.

This valuable plant is a native of the mountainous regions of Malabar, where it springs up spontaneously in the forests after the removal of the undergrowth. From time immemorial great numbers of the natives have depended for a livelihood upon its cultivation. It begins to yield fruit at the end of the fourth year, and continues to bear for several years afterwards. The capsules when ripe are picked from the fruit stems, dried over a gentle fire, and separated by rubbing with the hands from the footstalks and adhering calyx.

Thus prepared, they are from four to seven lines long, from three to four thick, three-sided with rounded angles, obscurely pointed at both ends, longitudinally wrinkled, and of a yellowish-white colour. The seeds which they contain are small, angular, irregular, rough as if embossed upon their surface, of a brown colour, easily reduced to powder, and thus separable from the capsules, which, though slightly aromatic, are much less so than the seeds, and should be rejected when the medicine is given in substance. The odour of cardamom is fragrant, the taste warm, slightly pungent, and highly aromatic. These properties are extracted by water and alcohol, but more readily by the latter. They depend on a volatile oil which rises with water in distillation. The seeds contain, according to Trommsdorff, 4.6 per cent. of volatile oil, 10.4 of fixed oil, 2.5 of a salt of potassa mixed with a colouring principle, 3.0 of starch, 1.8 of azotized mucilage, 0.4 of yellow colouring matter, and 77.3 of ligneous fibre. The volatile oil is colourless, of an agreeable and very penetrating odour, and of a strong, aromatic, burning, camphorous, and slightly bitter taste. Its sp. gr. is 0.945. It cannot be kept long without undergoing change, and finally, even though excluded from the air, loses its peculiar odour and taste. (Trommsdorff, *Annalen der Pharmacie, July*, 1834.) The seeds should be powdered only when wanted for immediate use, as they retain their aromatic properties best while enclosed within the capsules.

Medical Properties and Uses. Cardamom is a warm and grateful aromatic, less heating and stimulating than some others belonging to the class, and very useful as an adjuvant or corrective of cordial, tonic, and purgative medicines. Throughout the East Indies it is largely consumed as a condiment, and is considered almost among the necessaries of life. It was known to the ancients, and derived its name from the Greek language. In this country it is employed chiefly as an ingredient in compound preparations.

Off. Prep. Confectio Aromatica, *Lond., Dub.;* Extract. Colocynth. Comp., *U.S., Lond., Dub.;* Pil. Scilliticæ, *Ed.;* Pulvis Aromaticus, *U.S., Lond., Ed., Dub.;* Spirit. Æther. Aromat., *Lond.;* Tinct. Cardamomi, *U.S., Lond., Ed., Dub.;* Tinct. Cardam. Comp., *Lond., Dub.;* Tinct. Cinnam. Comp., *U.S., Lond., Ed.;* Tinct. Gentian. Comp., *U.S., Lond., Dub.;* Tinct. Rhei, *U.S., Lond., Ed.;* Tinct. Rhei Comp., *Dub.;* Tinct. Rhei et Aloës, *U.S., Dub.;* Tinct. Sennæ, *Lond., Dub.;* Tinct. Sennæ et Jalapæ, *U.S.;* Tinct. Conii, *Ed., Dub.;* Vinum Aloes, *U.S., Ed.* W.

CAROTA. *U.S. Secondary.*

Carrot Seed.

"Daucus carota. Semina. *The seeds.*" *U.S.*

Off. Syn. DAUCI SEMINA. Daucus Carota (agrestis). Semina. *Lond.;* DAUCUS CAROTA. Var. SYLVESTRIS. Semina. *Dub.*

DAUCI RADIX. *Lond.*

Garden Carrot Root.

"Daucus carota (hortensis). *Radix.*" *Lond.*

Off. Syn. DAUCUS CAROTA. Radix. *Dub.*

Carotte, *Fr.;* Gemeine Möhre, Gelbe Rübe, *Germ.;* Carota, *Ital.*, Lanahoria, *Span.*

Daucus. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferæ.

Gen. Ch. *Corolla* somewhat rayed. *Florets* of the disk abortive. *Fruit* hispid with hairs. *Willd.*

Daucus Carota. Willd. *Sp. Plant.* i. 1389; Woodv. *Med. Bot.* p. 130. t. 50. The wild carrot has a biennial spindleshaped root, and an annual, round, furrowed, hairy stem, which divides into long, erect, flower-bearing branches, and rises two or three feet in height. The leaves are hairy, and stand on footstalks nerved on their under side. The lower are large and tripinnate; the upper, smaller and less compound; in both, the leaflets are divided into narrow pointed segments. The flowers are small, white, and disposed in many-rayed compound umbels, which are at first flat on the top and spreading, but when the seeds are formed, contract so as to present a concave cup-like surface. A sterile flower of a deep purple colour is often observable in the centre of the umbel. The general involucrum is composed of several leaves, divided into long narrow segments; the partial is more simple. The petals are five, unequal, and cordate. The fruit consists of two plano-convex hispid seeds, connected by their flat surface.

The Daucus Carota is exceedingly common in this country, growing along the fences, and in neglected fields, which in the months of June and July are sometimes white over their whole surface with its flowers. It grows wild also in Europe, from which it is supposed by some botanists to have been introduced into the United States. The well-known garden carrot is the same plant somewhat altered by cultivation. The officinal portions are the seeds of the wild, and the root of the cultivated variety.

1. Carrot Seeds. These are very light, of a brownish colour, of an oval shape, flat on one side, convex on the other, and on their convex surface presenting four longitudinal ridges, to which stiff whitish hairs or bristles are attached. They have an aromatic odour, and a warm, pungent, and bitterish taste. By distillation they yield a pale yellow volatile oil, upon which their virtues chiefly depend. Boiling water extracts their active properties.

Medical Properties and Uses. Carrot seeds are moderately excitant and diuretic, and are considerably employed, both in domestic practice and by physicians, in chronic nephritic affections, and in dropsy. As they possess to a certain extent the cordial properties of the aromatics, they are especially adapted to cases in which the stomach is enfeebled. They are said to afford relief in the strangury from blisters. From thirty grains to a drachm of the bruised seeds may be given at a dose; or a pint of the infusion, containing the virtues of half an ounce or an ounce of the seeds, may be taken during the day. The whole umbel is often used instead of the seeds alone.

2. Carrot Root. The root of the wild carrot is whitish, hard, coriaceous, branched, of a strong smell, and an acrid disagreeable taste; that of the cultivated variety is reddish, fleshy, thick, conical, rarely branched, of a pleasant odour, and a peculiar sweet, mucilaginous taste. The constituents of the roots are crystallizable and uncrystallizable sugar, a little starch, extractive, gluten, albumen, volatile oil, vegetable jelly (*pectin* of Braconnot), malic acid, saline matters, lignin, and a peculiar crystallizable colouring principle, without odour or taste, called *carotin.* In relation to the nature of *vegetable jelly* much uncertainty has existed. By some it has been considered a modification of gum or mucilage combined with vegetable acid. Braconnot at one time considered it closely analogous to, if not identical with, his pectic acid; but more recent investigations have led him to the conclusion that it is a peculiar principle, out of which the pectic acid is formed by the reaction of an alkali. He proposes to call it *pectin*, a name derived from the Greek word πηκτις and expressive of the peculiar property of gelatinizing, by which it is distinguished. It exists more or less in all vegetables, and is abundant in certain fruits and roots from which jellies are prepared. It may be separated from the juice of fruits by the addition of alcohol, which precipitates it in the form of a jelly. This being washed with weak alcohol and dried, yields a semitransparent substance bearing some resemblance to fish-glue or isinglass. Immersed in 100 parts of cold water, it swells like bassorin, and is ultimately dissolved, forming a homogeneous jelly. With a larger proportion of water it exhibits a mucilaginous consistence. It is less acted on by boiling than by cold water. When perfectly pure it is tasteless and has no effect on vegetable blues. A striking peculiarity is, that by the agency of a fixed alkali or alkaline earthy base it is instantly converted into pectic acid, which unites with the base to form a pectate. This may be decomposed by the addition of an acid, which unites with the alkali and separates the pectic acid. (Braconnot, *Annales de Chimie, Juilet* 1831.) The *pectic acid* thus obtained is in the form of a colourless jelly, slightly acidulous, with the property of reddening litmus paper, scarcely soluble in cold water, more soluble in boiling water, and forming with the latter a solution, which, though it does not become solid on cooling, is coagulated by the addition of alcohol, lime-water, acids or salts, and even of sugar if allowed to stand for some time. With the alkalies the acid forms salts which are also capable of assuming the consistence of a jelly. With the earths and metallic oxides it forms insoluble salts. Braconnot thinks that the pectic acid exists in many plants already formed, being produced by the reaction of alkalies present in the plant upon the pectin.

Medical Properties and Uses. The wild root possesses the same properties with the seeds, and may be used for the same purposes. That of the garden plant has acquired much reputation as an external application to phagedenic, sloughing, and cancerous ulcers, the fetor of which it is supposed to correct, while it sometimes changes the character of the diseased action. It is brought to the proper consistence by scraping. In this state it retains a portion of the active principles of the plant, which render it somewhat stimulant. Boiled and mashed, as usually recommended, the root is perfectly mild, and fit only to form emollient cataplasms.

Off. Prep. Cataplasma Dauci, *Dub.* W.

CARTHAMUS. *U. S. Secondary.*

Dyers' Saffron.

"Carthamus tinctorius. Flores. *The flowers.*" *U. S.*

Fleurs de carthame, Safran bâtard, *Fr.;* Färber Saflor, *Germ.;* Cartamo, *Ital. Span.*

Carthamus. *Sex. Syst.* Syngenesia Æqualis.—*Nat. Ord.* Compositæ Cinarocephalæ.

Gen. Ch. Receptacle paleaceous, setose. *Calyx* ovate, imbricated, with scales ovate, leafy at the end. *Seed-down* paleaceous, hairy, or none. *Willd.*

Carthamus tinctorius. Willd. *Sp. Plant.* iii. 1706. The *dyers' saffron* or *safflower* is an annual plant, with a smooth erect stem, somewhat branched at top, and a foot or two in height. The leaves are alternate, sessile, ovate, acute, entire, and furnished with spiny teeth. The flowers are compound, in large, terminal, solitary heads. The florets are of an orange-red colour with a funnelshaped corolla, of which the tube is long, slender, and cylindrical, and the border divided into five equal, lanceolate, narrow segments.

The plant is a native of the Levant and Egypt, but is cultivated in various parts of Europe and America. The florets are the part employed. They are brought to us chiefly from the ports of the Mediterranean. Considerable quantities are produced in this country, and sold under the name of American saffron.

Safflower in mass is of a red colour, diversified by the yellowness of the filaments contained within the floret. It has a peculiar slightly aromatic odour, and a scarcely perceptible bitterness. Among its ingredients are two colouring substances—one red, insoluble in water, slightly soluble in alcohol, very soluble in alkaline liquids, and called *carthamite,* (*carthamic acid* by Döbereiner:) the other yellow and soluble in water. It is the former which renders safflower useful as a dye-stuff. Carthamite mixed with finely powdered talc forms the cosmetic powder known by the name of *rouge.*

These flowers are sometimes fraudulently mixed with saffron, which they resemble in colour, but from which they may be readily distinguished by their tubular form, and by the yellowish style and filaments which they enclose.

Medical Properties. In large doses carthamus is said to be laxative; and administered in the state of warm infusion it proves somewhat diaphoretic. It is used in domestic practice, as a substitute for saffron, in measles, scarlatina, and other exanthematous diseases, in order to promote the eruption. An infusion made in the proportion of two drachms to a pint of boiling water is usually employed, and given without restriction as to quantity.

W.

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CARUM. *U. S.*

Caraway.

"Carum carui. Semina. *The seeds.*" *U. S.*

Off. Syn. CARUI SEMINA. Carum Carui. Semina. *Lond.;* CARI CARUI SEMINA. *Ed.;* CARUM CARUI. Semina. *Dub.*

Carvi, *Fr., Ital.;* Gemeiner Kümmel, *Germ.;*, Alcaravea, *Span.*

Carum. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferæ.

Gen. Ch. *Fruit* ovate-oblong, striated. *Involucre* one-leafed. *Petals* keeled, inflexed-emarginate. *Willd.*

Carum Carui. Willd. *Sp. Plant.* i. 1470; Woodv. *Med. Bot.* p. 102. t. 41. This plant is biennial and umbelliferous, with a spindleshaped, fleshy, whitish root, and an erect stem, about two feet in height, branching above, and furnished with doubly pinnate, deeply incised leaves, the segments of which are linear and pointed. The flowers are small and white, and terminate the branches of the stem in erect umbels, which are accompanied with an involucre consisting sometimes of three or four leaflets, sometimes of one only, and are destitute of partial involucre. Each flower is succeeded by two seeds.

The caraway plant is a native of Europe, growing wild in meadows and pastures, and cultivated in many places. It has been introduced into this country. The flowers appear in May and June, and the seeds, which are not perfected till the second year, ripen in August. The root, when improved by culture, resembles the parsnip, and is used as food by the inhabitants of the North of Europe. The seeds are the part used in medicine. They are collected by cutting down the plant and threshing it on a cloth. Our markets are supplied partly from Europe, partly from our own gardens. The American seeds are usually rather smaller than those brought from Germany.

Caraway seeds are about two lines in length, slightly curved, with five longitudinal ridges which are of a light yellowish colour, while the intervening spaces are dark brown. They have a pleasant aromatic smell, and a sweetish, warm, spicy taste. These properties depend on an essential oil, which they afford largely by distillation. The residue is insipid. They yield their virtues readily to alcohol, and more slowly to water.

Medical Properties and Uses. Caraway is a pleasant stomachic and carminative, occasionally used in flatulent colic, and as an adjuvant or corrective of other medicines. The dose in substance is from a scruple to a drachm. An infusion may be prepared by adding two drachms of the seeds to a pint of boiling water. The volatile oil, however, is most employed. (See *Oleum Cari.*) The seeds are sometimes baked in cakes, to which they communicate an agreeable flavour, while they serve to stimulate the digestive organs.

Off. Prep. Aqua Carui, *Lond., Dub.;* Confectio Opii, *Lond., Dub.;* Confectio Rutæ, *Lond., Dub.;* Decoctum Anthemidis Nobilis, *Ed.;* Emplastrum Cumini, *Lond.;* Oleum Cari, *U. S., Lond., Dub.;* Spiritus Carui, *Lond., Ed., Dub.;* Spiritus Juniperi Compositus, *U. S., Lond., Dub.;* Tinct. Cardamomi Comp., *Lond., Dub.;* Tinct. Sennæ Comp., *Lond., Dub.;* Tinct. Sennæ et Jalapæ, *U.S., Ed.* W.

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CARYOPHYLLUS. *U.S.*

Cloves.

"Eugenia caryophyllata. Gemmæ florales. *The flower buds.*" *U. S.*

Off. Syn. CARYOPHYLLI. Eugenia caryophyllata. Flores nondum explicati, exsiccati. *Lond.;* EUGENIÆ CARYOPHYLLATÆ FLO-

RES. Flores nondum expliciti. *Ed.;* CARYOPHYLLUS. EUGENIA CARYOPHYLLATA. Flores nondum expliciti. *Dub.*

Girofle, Clous de Girofles, *Fr.;* Gewürznelken, *Germ.;* Garofani, *Ital.;* Clavos de espicia, *Span.;* Cravo da India, *Portuguese;* Kruidnagel, *Dutch;* Kerunful, *Arab.*

The genus to which the clove-tree belongs, was denominated *Caryophyllus* by Linnæus. Botanists afterwards ascribed the plant to the genus *Eugenia*, with the specific title *caryophyllata;* and this reference is supported by the authority of all the British Pharmacopœias, as well as that of the United States. It appears, however, that there are slight differences between the characters of the clove-tree and those of the other *Eugeniæ*, which have induced some botanists to arrange the former in a distinct genus. In Persoon's Synopsis, Loudon's Encyclopædia of plants, and various French works, it is described under the title of *Caryophyllus aromaticus;* and according to this arrangement, is the only species of its genus. The characters of the Caryophyllus, as given in Loudon's Encyclopædia, are—" *Calyx* funnel-shaped; *fruit* dry, one or two-celled; otherwise like Eugenia."

EUGENIA. *Sex. Syst.* Icosandria Monogynia.—*Nat. Ord.* Myrtaceæ.

Gen. Ch. *Calyx* four-parted, superior. *Petals* four. *Berry* one-celled, one-seeded. *Willd.*

Eugenia caryophyllata. Willd. *Sp. Plant.* ii. 965; Woodv. *Med. Bot.* p. 538. f. 193. This small tree is one of the most elegant of those which inhabit the sunny clime of India. It has a pyramidal form, is always green, and is adorned throughout the year with a succession of beautiful rosy flowers. The stem is of hard wood, and covered with a smooth grayish bark. The leaves are about four inches in length by two in breadth, ovate lanceolate, pointed at both ends, entire, sinuated, with many parallel veins on each side of the midrib, supported upon long footstalks, and opposite to each other upon the branches. They have a firm consistence, a shining green colour, and when bruised are highly fragrant. The flowers are disposed in terminal corymbose panicles, and exhale a strong, penetrating, and grateful odour.

The natural geographical range of the clove-tree is extremely limited. It was formerly confined to the Molucca islands, in most of which it grew abundantly before their conquest by the Dutch. By the monopolizing policy of this commercial people, the trees were extirpated in nearly all the islands except Amboyna and Ternate, which were under their immediate inspection. Notwithstanding, however, the jealous vigilance of the Dutch, a French governor of the Isle of France and of Bourbon, named Poivre, succeeded, in the year 1770, in obtaining plants from the Moluccas, and introducing them into the colonies under his control. Five years afterwards, the clove-tree was introduced into Cayenne and the West Indies, and in 1803 into the Island of Sumatra. It is now cultivated largely in these and other places; and commerce has ceased to depend on the Moluccas for supplies of this valuable spice.

The unexpanded flower buds are the part of the plant employed, under the ordinary name of cloves.* They are first gathered when the tree is about six years old. It is said that the full-blown flower and the fruit are destitute of aromatic properties. The buds are picked by the hand, or separated from the tree by long reeds, and are then quickly dried. In the Moluccas they are said to be sometimes immersed in boiling water, and afterwards exposed to smoke and artificial heat, before being spread out in the sun. In Cayenne and the West Indies they are dried simply by the solar heat.

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* The peduncles of the flowers have been sometimes employed. They possess the odour and taste of the cloves, though in a less degree, and furnish a considerable quantity of essential oil. The French call them *griffes de girofles.*

Cloves appear to have been unknown to the ancients. They were first introduced into Europe by the Arabians, and were circulated through the medium of Venetian commerce. After the discovery of the southern passage to India, the trade in this spice passed into the hands of the Portuguese; but was subsequently wrested from them by the Dutch, by whom it was long monopolized. Within a few years, however, the extended culture of the plant has opened new sources of supply; and the commerce in cloves is no longer restricted to a single nation. The United States derive their chief supplies from the West Indies and the European colonies in Guiana. Of the average annual import, according to the custom house returns, from 1820 to 1828 inclusive, 43,240 pounds were brought from the West Indies or South America, and 12,828 from France; while from England, Holland, and the East Indies together, the amount imported was only 11,090 pounds; and as the cloves obtained from France were probably of American growth, it appears that we can receive but a very small proportion of those produced in the Moluccas. The latter are said to be thicker, darker, heavier, more oily, and more highly aromatic than those of the colonies to which the clove-tree has been transplanted.

Properties. Cloves resemble a nail in shape, are usually rather more than half an inch long, and have a round head with four spreading points beneath it. Their colour is externally deep brown, internally reddish; their odour strong and fragrant; their taste hot, pungent, aromatic, and very permanent. The best cloves are large, heavy, brittle, and exude a small quantity of oil on being pressed or scraped with the nail. When light, soft, wrinkled, pale, and of feeble taste and smell, they are inferior. We are told that those from which the essential oil has been distilled are sometimes fraudulently mixed with the genuine.

Trommsdorff obtained from 1000 parts of cloves 180 of volatile oil, 170 of astringent extractive matter, 130 of gum, 60 of resin, 280 of vegetable fibre, and 180 of water. M. Lodibert afterwards discovered a fixed oil, aromatic and of a green colour, and a white resinous substance which crystallizes in fasciculi composed of very fine diverging silky needles, without taste or smell, soluble in ether and boiling alcohol, and exhibiting no alkaline reaction. This substance, called by M. Bonastre *caryophyllin*, was found in the cloves of the Moluccas, of Bourbon, and of Barbadoes, but not in those of Cayenne. Berzelius considers it a stearoptene, and probably identical with that deposited by the oil of cloves when long kept. M. Dumas has discovered another crystalline principle, which forms in the water distilled from cloves, and is gradually deposited. Like caryophyllin, it is soluble in alcohol and ether, but differs from that substance in assuming a red colour when touched with nitric acid. M. Bonastre proposes for it the name of *eugenin*. (*Jour. de Pharm.* xx. 565.) Water extracts the odour of cloves with comparatively little of their taste. All their sensible properties are imparted to alcohol, and the tincture when evaporated leaves an excessively fiery extract, which becomes insipid when deprived of the oil by distillation with water, while the oil which comes over is mild. Hence it has been inferred that the pungency of this aromatic depends on a union of the essential oil with the resin. For an account of the oil of cloves, see *Oleum Caryophylli.*

Medical Properties and Uses. Cloves are among the most stimulant of the aromatics, but like others of this class exert less effect upon the system at large than on the part to which they are immediately applied. They are sometimes administered in substance or infusion to relieve nausea and vomiting, correct flatulence, and excite languid digestion; but their chief use is to assist or modify the action of other medicines. They enter as ingredients into several officinal preparations. Their dose in substance is from five to ten grains.

The French Codex directs a *tincture of cloves* to be prepared by digesting for six days, and afterwards filtering, a mixture of 2 parts by weight of powdered cloves and 8 of alcohol of 32° Baumé. Three ounces to the pint of rectified alcohol is a sufficiently near approximation.

Off. Prep. Confectio Aromatica, *Lond.*, *Dub.;* Confectio Scammoneæ, *Lond.*, *Dub.;* Infusum Caryophyllorum, *Lond.*, *Dub.;* Infusum Aurantii Compositum, *Lond.*, *Dub.;* Mistura Ferri Aromatica, *Dub.;* Spiritus Ammoniæ Aromaticus, *Lond.;* Spiritus Lavandulæ Compositus, *U.S.*, *Dub.;* Syrupus Rhei Aromaticus, *U.S.;* Vinum Opii, *U.S.*, *Lond.*, *Ed.*, *Dub.*

W.

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CASCARILLA. *U.S.*

Cascarilla.

"Croton Eleutheria. Cortex. *The bark.*" *U.S.*

Off. Syn. CASCARILLÆ CORTEX. Croton Cascarilla. Cortex. *Lond.;* CROTONIS ELEUTHERIÆ CORTEX. *Ed.;* CASCARILLA. CROTON CASCARILLA. Cortex. *Dub.*

Cascarille, *Fr.;* Cascarillrinde, *Germ.;* Cascariglia, *Ital.;* Chacarila, *Span.*

Croton. *Sex. Syst.* Monœcia Monadelphia.—*Nat. Ord.* Euphorbiaceæ.

Gen. Ch. Male. *Calyx* cylindrical, five-toothed. *Corolla* five-petalled. *Stamens* ten to fifteen. Female. *Calyx* many-leaved. *Corolla* none. *Styles* three, bifid. *Capsule* three-celled. *Seed* one. *Willd.*

Cascarilla has been ascribed by different authors to different species of Croton. The London and Dublin Pharmacopœias indicate the *C. Cascarilla;* those of the United States and of Edinburgh, the *C. Eleutheria.* Both species grow in the West Indies, and it is not impossible that the bark of both may have been sold as cascarilla; but there is reason to believe that the C. Eleutheria is at least the most abundant source of it.

Croton Eleutheria. Willd. *Sp. Plant.* iv. 545; Sloane's Jamaica, vol. ii. t. 174. This species of Croton is a small tree or shrub, said by Browne to be four or five feet in height, but as seen by Dr. Wright in Jamaica, rising to twenty feet, and branching thickly towards the summit. The leaves are entire, ovate or cordate lanceolate, and elongated towards the apex, which is blunt. They are of a bright green colour upon their upper surface, and stand alternately upon short footstalks. The flowers, which are of a whitish colour, are disposed in axillary and terminal racemes. This shrub grows wild in the West Indies, especially the Bahama islands, in one of which—the small island of Eleutheria—it is found so abundantly as to have received its name from that circumstance. It is called by Browne *sea-side balsam.*

Croton Cascarilla. Willd. *Sp. Plant.* iv. 531; Woodv. *Med. Bot.* p. 629. t. 222. This is still smaller than the preceding species, and is called by Browne the *small sea-side balsam.* The stem is branched and covered with a brown bark, of which the external coat is rough and whitish. The leaves are long, very narrow, somewhat pointed, entire, of a bright green colour on the upper surface, downy and of a silvery whiteness on the under.

They are placed alternately on short foot-stalks. The flowers are small, greenish, and disposed in long terminal spikes. This plant is a native of the Bahamas, has been found abundantly in Hayti, and is said also to grow in Peru and Paraguay. Browne describes it as hot and pungent to the taste. The *Croton lineare* of Jacquin, considered by Willdenow as a variety of the C. Cascarilla, is made a distinct species by Sprengel. It is the wild rosemary of Jamaica, and is said by Dr. Wright to have none of the sensible qualities of cascarilla. Dr. A. T. Thomson may allude to this plant when he states, that the London College erroneously refers the bark to the *Cascarilla* of Linnæus. It is highly probable that the proper *C. Cascarilla* contributes to furnish the medicine.

Cascarilla is brought to this market from the West Indies, and chiefly, as we have been informed, from the island of Eleutheria.* It comes in bags or casks. We have observed it in the shops in two forms so distinct as almost to deserve the title of varieties. In one, the bark is in rolled pieces of every size from three or four inches in length and half an inch in diameter to the smallest fragments, covered externally with a dull whitish or grayish-white epidermis, which in many portions is partially, sometimes wholly removed, leaving a dark-brown surface, while the inner surface has a chocolate colour, and the fracture is reddish-brown. The small pieces are sometimes curled, but have a distinct abrupt edge as if broken from the branches. The second variety, which is now most common in the Philadelphia market, consists entirely of very small pieces not more than an inch or two in length, very thin, without the white epidermis, not regularly quilled, but curved more or less in the direction of their length, often having a small portion of woody fibre attached to their inner surface, and presenting an appearance precisely as if shaved by a knife from the stem or branches of the shrub. Whether these two varieties are derived from distinct species, or differ only from the mode of collection, or the part of the plant from which they are taken, it is difficult to determine. May not one be the product of the C. Cascarilla, the other of the C. Eleutheria?

Properties. Cascarilla has an aromatic odour, rendered much more distinct by friction, and a warm, spicy, bitter taste. It is brittle, breaking with a short fracture. When burnt it emits a pleasant odour very closely resembling that of musk, but weaker and more agreeable. This property serves to distinguish it from all other barks. Trommsdorff found it to contain 1.6 of a greenish-yellow volatile oil, having a penetrating odour analogous to that of the bark, and the sp. gr. 0.938, 15.1 of a brown, soft, slightly bitter resin, 18.7 of bitter extractive mixed with gum and traces of muriate of potassa, and 65.6 of lignin. (Berzelius, *Traité de Chim.*) Either alcohol or water will partially extract its active matters; but diluted alcohol is the proper menstruum.

Medical Properties and Uses. This bark is aromatic and tonic. It was known in Germany so early as the year 1690, and was much used as a substitute for Peruvian bark by those who were prejudiced against this febrifuge, in the treatment of remittent and intermittent fevers. It has, however, lost much of its reputation; and is now employed only where a pleasant and gently stimulant tonic is desirable; as in dyspepsia, chronic diarrhœa and dysentery, flatulent colic, and other cases of debility of the stomach or bowels. It is sometimes advantageously combined with the more powerful bitters. It may be given in powder or infusion. The dose of the former is from a scruple to half a drachm, which may be repeated several times a day. In consequence of its pleasant odour when burnt, some smokers mix it in small quantity with their tobacco; but it is said when thus employed to occasion vertigo and intoxication.

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* In a note by Mr. Don, published in the Edinburgh New Philosophical Journal for April 1834, the author observes; "I rather incline to the opinion of Boulduc, Spielman, and others, that the cascarilla bark is a production of the Spanish Main, for it does not appear that it ever was obtained from Jamaica, or even from the Bahama Islands." Upon inquiry from merchants engaged in the trade of drugs in Philadelphia, we have learned, that cascarilla is brought from the Bahama Islands, and that little or none comes from other places.

Off. Prep. Extractum Cascarillæ, *Dub.;* Infusum Cascarillæ, *U.S., Lond., Dub.;* Tinctura Cascarillæ, *Lond., Dub.* W.

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CASSIA FISTULA. *U.S.*

Purging Cassia.

"Cassia fistula. *Willd.* Cathartocarpus fistula. *Persoon.* Fructus. *The fruit.*" *U.S.*

Off. Syn. CASSIÆ PULPA. Cassia Fistula. Lomentorum pulpa. *Lond.;* CASSIÆ FISTULÆ FRUCTUS. *Ed.;* CASSIA FISTULA. Pulpa leguminis. *Dub.*

Casse, *Fr.;* Röhrenkassie, *Germ.;* Polpa di Cassia, *Ital.;* Cana Fistula, *Span.*

Cassia. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Leguminosæ.

Gen. Ch. *Calyx* five-leaved. *Petals* five. *Anthers* three upper, sterile; three lower, beaked, *Lomentum. Willd.*

The tree which yields the purging cassia is ranked by many botanists in a distinct genus, separated from the Cassia and denominated *Cathartocarpus*, of which the following is given as the essential generic character. "*Calyx* five-parted, deciduous. *Corolla* regular, of five petals. The lower *filaments* bowed. *Pod* long, woody, many-celled. *Cells* filled with pulp." *Lindley*, in *Loud. Encyc. of Plants.*

Cassia Fistul. Willd. *Sp. Plant.* ii. 518; Woodv. *Med. Bot.* p. 445. t. 160.—*Cathartocarpus Fistula.* Persoon, *Synops.* i. 459. This is a large tree, rising to the height of forty or fifty feet, with a trunk of hard heavy wood, dividing towards the top into numerous spreading branches, and covered with a smooth ash-coloured bark. The leaves are commonly composed of five or six pairs of opposite leaflets, which are ovate, pointed, undulated, smooth, of a pale green colour, from three to five inches long, and supported upon short petioles. The flowers are large, of a golden yellow colour, and arranged in long pendent axillary racemes. The fruit consists of long, cylindrical, woody, dark-brown, pendulous pods, which, when agitated by the wind, strike against each other, and produce a sound that may be heard at a considerable distance.

This species of Cassia is a native of Upper Egypt and India, whence it is generally supposed to have been transplanted to other parts of the world. It is at present very extensively diffused through the tropical regions of the old and new continents, being found in Insular and Continental India, Cochin China, Egypt, Nubia, the West Indies, and the warmer parts of America. The fruit is the officinal portion of the plant. It is imported from the East and West Indies, chiefly from the latter, though at present it is very rare in our markets.

Properties. Cassia pods are a foot or more in length, straight or but slightly curved, cylindrical, less than an inch in diameter, with a woody shell, externally of a dark brown colour, and marked with three longitudinal shining bands, extending from one end to the other, two of which are in close proximity, appearing to constitute a single band, and the third is on the opposite side of the pod. These bands mark the place of junction of the valves of the legume, and are represented as sometimes excavated in the form of furrows. There are also circular depressions at unequal distances. Internally the pod is divided into numerous cells by thin transverse plates, which are covered with a soft, black pulp. Each cell contains a single, oval, shining seed. The pods brought from the East Indies are smaller, smoother, have a blacker pulp, and are more highly esteemed than those which come from the West Indies. We have seen a quantity of pods in this market, said to have been brought from Barbary, and sold as cassia pods, which were an inch and a half in diameter, flattened on the sides, exceedingly rough on the outer surface, and marked by three longitudinal very elevated ridges, corresponding to the bands or furrows of the common cassia. The pulp was rather nauseous, but answered all the purposes required of the medicine. They were probably derived from a different plant.

The heaviest pods, and those which do not make a rattling noise when shaken, are to be preferred, as they contain a larger portion of the pulp, which is the part employed. This should be black and shining, and have a sweet taste. It is apt to become sour if long exposed to the air, or mouldy if kept in a damp place. The pulp is extracted from the pods by first bruising them, then boiling them in water, and afterwards evaporating the decoction; or, when the pods are fresh, by opening them at the sutures, and removing the pulp by a spatula.

The pulp is the portion considered officinal by the London and Dublin Colleges; but as it is the pod that is usually kept in the shops, the Edinburgh and United States Pharmacopœias designate the latter. Cassia pulp has a slight rather sickly odour, and a sweet mucilaginous taste. From the analysis of M. Henry it appears to contain sugar, gum, a substance analogous to tannin, a colouring matter soluble in ether, traces of a principle resembling gluten, and a small quantity of water.

Medical Properties and Uses. Cassia pulp is gently laxative, and may be advantageously given in small doses in cases of habitual costiveness. In quantities sufficient to purge, it occasions nausea, flatulence, and griping. In this country it is very rarely prescribed, except as an ingredient in the confection of senna, which is a highly pleasant and useful laxative preparation. The dose of the pulp as a laxative is one or two drachms, as a purge one or two ounces.

Off. Prep. Confectio Cassiæ, *Lond.*, *Ed.*, *Dub.;* Confectio Sennæ, *U.S.*, *Lond.* W.

CASSIA MARILANDICA. *U.S.*

American Senna.

“Cassia Marilandica. Folia. *The leaves.*” *U.S.*

CASSIA. See CASSIA FISTULA.

Cassia Marilandica. Willd. *Sp. Plant.* ii. 524; Bigelow, *Am. Med. Bot.* ii. 116; Barton, *Med. Bot.* i. 137. This is an indigenous perennial plant, of vigorous growth, sending up annually numerous round, erect, nearly smooth stems, which are usually simple, and rise from three to six feet in height. The leaves are alternate, and composed of from eight to ten pairs of oblong lanceolate, smooth, mucronate leaflets, green on their upper surface, pale beneath, and connected by short petioles with the common footstalk, which is compressed, channeled above, and furnished near its base with an ovate, stipitate gland. The flowers, which are of a beautiful golden yellow colour, grow in short axillary racemes at the upper part of the stem. The calyx is composed of five oval, obtuse, unequal, yellow leaves; the corolla of the same number of spatulate, concave petals, of which three are ascending, and two descending and larger than the others. The stamens are ten, with yellow filaments and brown anthers, which open by a terminal pore. The three upper stamens bear short abortive anthers; the three lowermost are long, curved, and tapering into a beak. The germ, which descends with the latter, bears an erect style terminating in a hairy stigma. The fruit is a pendulous legume, from two to four inches long, linear, curved, swelling at the seeds, somewhat hairy, and of a blackish colour.

The *American senna*, or *wild senna* as it is sometimes called, is very common in all parts of the United States south of New York, and grows naturally as far northward as the southern boundary of Massachusetts. It prefers a low moist rich soil, in the vicinity of water, and though frequently found in dryer and more elevated places, grows most abundantly and luxuriantly in the flat ground on the borders of rivers and ponds. It is sometimes cultivated to the northward in gardens for medical use. In the months of July and August, when it is in full bloom, it exhibits a rich and beautiful appearance. The leaves should be collected in August, or the beginning of September, and carefully dried.

They are sometimes brought into the market compressed into oblong cakes, such as those prepared by the Shakers from most herbaceous medicinal plants. The leaflets are from an inch and a half to two inches long, from one quarter to half an inch in breadth, thin, pliable, and of a pale green colour. They have a feeble odour, and a nauseous taste somewhat analogous to that of senna. Water and alcohol extract their virtues. They were analyzed by Mr. Martin, of Philadelphia, and found to contain a principle analogous to *cathartin* in chemical properties and effects on the system, albumen, mucilage, starch, chlorophylle, yellow colouring matter, volatile oil, fatty matter, resin, and lignin, besides salts of potassa and lime. (*Am. Journ. of Pharm.* I. 22.)

Medical Properties and Uses. American senna is an efficient and safe cathartic, closely resembling the imported senna in its action, and capable of being substituted for it in all cases in which the latter is employed. It is, however, less active; and to produce an equal effect must be administered in a dose about one-third larger. It is habitually used by many practitioners in the country. Like senna, it is most conveniently given in the form of infusion, and should be similarly combined in order to obviate its tendency to produce griping. W.

CASTANEA. *U.S. Secondary.*

Chinquapin.

"Castanea pumila. Cortex. *The bark.*" *U.S.*

Castanea. *Sex. Syst.* Monœcia Polyandria.—*Nat. Ord.* Cupuliferæ.

Gen. Ch. Male. *Ament* naked. *Calyx* none. *Corolla* five-petalled. *Sta-*

mens ten to twenty. Female. *Calyx* five or six-leaved, muricate. *Corolla* none. *Germs* three. *Stigmas* pencil-formed. *Nuts* three, included in the echinated calyx. *Willd.*

Castanea pumila. Willd. *Sp. Plant.* iv. 461; Michaux, *N. Am. Sylv.* iii. 15. The chinquapin is an indigenous shrub or small tree, which, in the Middle States, rarely much exceeds seven or eight feet in height; but in Carolina, Georgia, and Louisiana, sometimes attains an elevation of thirty or forty feet, with a diameter of trunk equal to twelve or fifteen inches. The leaves are oblong, acute, mucronately serrate, and distinguished from those of the chestnut, which belongs to the same genus, by their whitish and downy under surface. The barren flowers are grouped upon axillary peduncles three or four inches long; the fertile aments are similarly disposed but less conspicuous. The fruit is spherical, covered with sharp prickles, and encloses a brown nut which is sweet and edible, but differs from the chestnut in being much smaller, and convex on both sides.

The tree extends from the banks of the Delaware, southward to the Gulf of Mexico, and south-westward to the Mississippi. It is most abundant in the southern portion of this tract of country. The bark is the part used. It is astringent and tonic, and has been employed in the cure of intermittents; but has no peculiar virtues to recommend it, and might well be spared even from the Secondary Catalogue of the Pharmacopœia. W.

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CASTOREUM. *U.S., Lond., Ed., Dub.*

Castor.

"Castor fiber. Concretum sui generis. *A peculiar concrete substance.*" *U.S.*

Castoréum, *Fr.;* Bibergeil, *Germ.;* Castoro, *Ital.;* Castoreo, *Span.*

In the beaver, *Castor fiber* of naturalists, between the anus and external genitals of both sexes, are two pairs of membranous follicles, of which the lower and larger are pear-shaped, and contain an oily, viscid, highly odorous substance, secreted by glands which lie externally to the sac. This substance is called castor. After the death of the animal, the follicles containing it are removed and dried either by smoke or in the sun; and in this state are brought into the market.

This drug is derived either from the northern and north-western parts of the American continent, or from the Russian dominions; and is distinguished according to its source into the Canadian or American and Russian castor. Of the latter but a very small portion reaches this country. That which is brought to Philadelphia is derived chiefly from Missouri.

Castor comes to us in the form of solid unctuous masses, contained in sacs about two inches in length, larger at one end than at the other, much flattened and wrinkled, of a blackish colour externally, and united in pairs by the excretory ducts which connect them in the living animal. In each pair, one sac is generally larger than the other. They are divided internally into numerous cells containing the castor, which, when the sacs are cut or torn open, is exhibited of a brown or reddish-brown colour, intermingled more or less with the whitish membrane forming the cells. Those brought from Russia are larger, fuller, heavier, and less tenacious than the American; and their contents, which are of a rusty or liver-colour, have a stronger taste and smell, and are considered more valuable as a medicine. In the castor from Missouri, the contents of the sac are sometimes almost white, and evidently of inferior quality. It is said by M. Kohli, that the Canadian castor, treated with distilled water and ammonia, affords an orange precipitate, while the matter thrown down by the Russian under similar treatment is white.

Properties. Good castor has a strong, fetid, peculiar odour, a bitter, acrid, and nauseous taste; and a colour more or less tinged with red. It is of a softer or harder consistence according as it is more or less thoroughly dried. When perfectly desiccated, though still somewhat unctuous to the touch, it is hard, brittle, and of a resinous fracture. Its chemical constituents, according to Brandes, whose analysis is the most recent, are volatile oil; a resinous matter; albumen; a substance resembling ozmazome; mucus; urate, carbonate, benzoate, phosphate, and sulphate of lime; acetate and muriate of soda; muriate, sulphate, and benzoate of potassa; carbonate of ammonia; membranous matter; and a peculiar proximate principle previously discovered by M. Bizio, an Italian chemist, and called by him *castorin.* This principle crystallizes in long, diaphanous, fasciculated prisms, has the smell of castor, of which it is alleged to be the active constituent, and a taste like that of copper. It is insoluble in cold water and in cold alcohol; but is dissolved by one hundred parts of the latter liquid at the boiling temperature, and by the essential oils. It possesses neither alkaline nor acid properties. It may be obtained by treating castor minutely divided with six times its weight of boiling alcohol, filtering the liquor while hot, and allowing it to cool. The *castorin* is slowly deposited, and may be purified by the action of cold alcohol. Its claim to be considered the active principle of castor is very doubtful.

Alcohol and sulphuric ether extract the virtues of castor. An infusion made with boiling water has its sensible properties in a slight degree; but the odorous principle of the drug is dissipated by decoction.

The virtues of castor are impaired by age; and the change is more rapid in proportion to the elevation of temperature. Moisture promotes its speedy decomposition. In a dry cool place it may be kept for a long time without material deterioration. When quite black, with little taste or smell, it is unfit for use. A factitious preparation is sometimes sold, consisting of a mixture of various drugs, scented with genuine castor, intermingled with membrane, and stuffed into the scrotum of a goat. The fraud may be detected by the comparatively feeble odour, the absence of other characteristic sensible properties, and the want of the smaller follicles containing fatty matter, which are always attached to the real bags of castor.

Medical Properties and Uses. Castor is moderately stimulant and antispasmodic. The experiments of Thouvenel prove, that in large doses it quickens the pulse, increases the heat of the skin, and produces other symptoms of general excitement; but its force is chiefly directed to the nervous system, and in small doses it scarcely disturbs the circulation. It has also enjoyed a high reputation as an emmenagogue. It was employed by the ancients. Pliny and Dioscorides speak of it as useful in hysteria and amenorrhœa. In Europe, especially on the continent, it is still frequently prescribed in low forms of fever attended with nervous symptoms, in spasmodic diseases, such as hysteria and epilepsy, in many anomalous nervous affections, and in diseases dependent on or connected with suppression or retention of the menses. The practitioners of this country rarely resort to it. The dose in substance is from ten to twenty grains, which may be given in bolus, or emulsion. The tincture is sometimes employed.

Off. Prep. Tinctura Castorei, *U.S.*, *Lond.*, *Ed.*; Tinctura Castorei Rossici, *Dub.* W.

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CATECHU. *U.S.*

Catechu.

"Acacia catechu. Extractum. *The extract.*" *U.S.*

Off. Syn. CATECHU EXTRACTUM. Acacia Catechu. Extractum. *Lond.*; ACACIÆ CATECHU EXTRACTUM. Ex ligno. *Ed.*; CATECHU. ACACIA CATECHU. Extractum ex ligno. *Dub.*

Cachou, *Fr.*; Catechu, *Germ.*; Catecu, Catciu, Catto, *Ital.*; Catecu, *Span.*; Cutt, *Hindoostanee.*

Acacia. See ACACIÆ GUMMI.

Acacia Catechu. Willd. *Sp. Plant.* iv. 1079; Woodv. *Med. Bot.* p. 433. t. 157. According to Mr. Kerr, whose description has been followed by most subsequent writers, the Acacia Catechu is a small tree, seldom more than twelve feet in height, with a trunk one foot in diameter, dividing towards the top into many close branches, and covered with a thick, rough, brown bark. The leaves, which stand alternately upon the younger branches, are composed of from fifteen to thirty pairs of pinnæ nearly two inches long, each of which is furnished with about forty pairs of linear leaflets, beset with short hairs. At the base of each pair of pinnæ is a small gland upon the common footstalk. Two short, recurved spines are attached to the stem at the base of each leaf. The flowers are in close spikes, which arise from the axils of the leaves, and are about four or five inches long. The fruit is a lanceolate, compressed, smooth, brown pod, with an undulated thin margin; and contains six or eight roundish flattened seeds, which when chewed emit a nauseous odour.

This species of Acacia is a native of Hindostan, where it grows abundantly in the provinces of Bahar and Canara. Like most others of the same genus it abounds in astringent matter, which may be extracted by decoction. Catechu is an extract from the wood of the tree.

This drug had been long known in medicine before its true source was discovered. It was at first called *terra Japonica*, under the erroneous impression that it was an earthy substance derived from Japan. When ascertained by analysis to be of vegetable origin, it was generally considered by writers on the Materia Medica to be an extract obtained from the *betel-nut*, which is the fruit of a species of palm, denominated by Linnæus *Areca Catechu.* The true origin of the drug was made known by Mr. Kerr, assistant-surgeon of the civil hospital in Bengal, who had an opportunity not only of examining the tree from which it was obtained, but also of witnessing the process of its extraction. According to Mr. Kerr, the manufacturer, having carefully cut off the exterior white part of the wood, reduces the interior brown or reddish-coloured portion into chips, which he then boils in water in unglazed earthen vessels, till all the soluble matter is dissolved. The decoction thus obtained is evaporated first by artificial heat, and afterwards in the sun, till it has assumed a thick consistence, when it is spread out to dry upon a mat or cloth, being, while yet soft, divided by means of a string into square or quadrangular pieces. It is probable that some difference exists in the mode of its preparation. According to some authors, the unripe fruit and leaves are also submitted to decoction, and Mr. Kerr states that the areca nut may sometimes be added to the other ingredients in places where it is abundant. It is probable that what is sold as catechu in the East is derived from various sources. Dr. Duncan in his Dispensatory remarks, that many varieties have been sent to him from different parts of India, and M. Guibourt enumerates nine different kinds which have come into his possession (*Journ. de Pharm. Decemb.* 1831.) The name in the native language signifies the juice of a tree. We are informed by Dr. Ainslie, that, in the bazaars of Lower India, two astringent extracts are sold, resembling catechu in their properties, and employed for the same purposes both by the European and native practitioners. They are derived from the betel-nut, (fruit of the *Areca Catechu*,) and are much used by the natives for chewing, mixed with the leaves of the *Piper Betel*, commonly called betel leaves. They are, however, never exported in any considerable quantity.

Two commercial varieties of *catechu* are spoken of by authors; the *Bengal catechu*, procured chiefly in the province of Bahar, and shipped at Calcutta; and the *Bombay catechu*, prepared in Canara, and named from its place of export. We derive the drug directly from Calcutta, or by orders from London; and it is sold in our markets without reference to its origin. Dr. Duncan states, that the Bombay catechu is of a uniform texture and of a red-brown tint, while that from Bengal is more friable, less consistent, of a chocolate colour externally, with a mixture of chocolate and red-brown internally.

Properties. Catechu, as it comes to us, is in masses of different shapes, some roundish, some flattened, others cubical or oblong, or quite irregular, and of every grade in size, from small angular pieces, which are evidently fragments of the original cakes, to lumps which weigh nearly a pound. The colour is externally of a rusty brown, more or less dark, internally varying from a pale reddish or yellowish-brown to a dark liver colour. The extract has been distinguished into the pale and dark varieties; but there does not appear to be sufficient ground for retaining this distinction. Catechu is inodorous, with an astringent and bitter taste, which is followed by a sense of sweetness. It is brittle, and breaks with a fracture, which is rough in some specimens, in others uniform, resinous, and shining. That which is preferred in our market is of a dark colour, easily broken into small angular fragments, with a smooth glossy surface, bearing some resemblance to kino. Dr. A. T. Thomson observes, that the dark variety is heavier and has a more austere and bitter taste than the light. Catechu is often mixed with sand, sticks, and other impurities. Its chief chemical constituents are tannin, extractive, and mucilage. Out of 200 parts of Bombay catechu, Sir H. Davy obtained 109 parts of tannin, 68 of extractive, 13 of mucilage, and 10 of insoluble residue. The same quantity of Bengal catechu yielded 97 of tannin, 73 of extractive, 16 of mucilage, and 14 of insoluble residue. The chemical difference between the two commercial varieties is of no practical importance. Catechu is almost entirely soluble in large quantities of water. Dr. Duncan states that 18 ounces at 52° are required to 100 grains of the extract, of which about $\frac{1}{14}$ of earthy matter is left undissolved. The extractive is much less soluble than the astringent principle, which may be almost entirely separated from it by the frequent application of small quantities of cold water. Boiling water dissolves the extractive matter much more readily than cold, and deposites it of a reddish-brown colour upon cooling. The infusion of catechu is of a brown colour, and affords precipitates with concentrated sulphuric and muriatic acids; with the solutions of lime, strontia, and baryta; with the salts of alumina, the nitrate of potassa, sulphate of magnesia, ferrocyanate of potassa, acetate of lead, persulphate of iron, and solutions of albumen and gelatin. The alkalies prevent its precipitation by gelatin, and the carbonates of the alkalies produce only a slight turbidness. *Duncan.*

Medical Properties and Uses. Catechu is gently tonic, and powerfully astringent. The dark coloured has the latter property in a somewhat greater degree than the light, and is therefore usually preferred. The latter, being rather sweeter, is preferred by the Malays, Hindoos, and other Indians, who consume vast quantities of this extract by chewing it, mixed with a small proportion of lime and with aromatics, and wrapped in the leaf of the *Piper Betel.* Catechu may be advantageously used in most cases where astringents are indicated, and, though less employed in this country than kino, is not inferior to it in medicinal virtues. The complaints to which it is best adapted are diarrhœa dependent on debility or relaxation of the intestinal exhalents, and passive hemorrhages, particularly that from the uterus. A small piece of it, held in the mouth and allowed slowly to dissolve, is an excellent remedy in relaxation of the uvula, and the irritation of the fauces and troublesome cough which depend on it. Applied to spongy gums, in the state of powder, it sometimes proves useful; and it has been recommended as a dentrifice in combination with powdered charcoal, Peruvian bark, myrrh, &c. Sprinkled upon the surface of indolent ulcers, it is occasionally beneficial; and is much used in India for the same purpose mixed with other ingredients in the state of an ointment. An infusion or decoction of catechu may be used as an injection in obstinate gonorrhœa, gleet, and leucorrhœa; and we have found it highly beneficial when thrown up the nostrils in arresting epistaxis.

The dose is from ten grains to half a drachm, which should be frequently repeated, and is best given with sugar, gum Arabic, and water.

Off. Prep. Electuarium Catechu Compositum, *Ed., Dub.;* Infusum Catechu Compositum, *Lond.;* Infusum Acaciæ Catechu, *Ed.;* Tinctura Catechu, *U.S., Lond., Ed., Dub.* W.

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CENTAUREÆ BENEDICTÆ HERBA. *Ed.*

Blessed Thistle.

Off. Syn. CENTAUREA BENEDICTA. CNICUS BENEDICTUS. Folia. *Dub.*

Chardon benit, *Fr.;* Cardobenedikten, *Germ.;* Cardo santa, *Ital.;* Cardo bendito, *Span.*

CENTAUREA. *Sex. Syst.* Syngenesia Frustranea.—*Nat. Ord.* Compositæ Cinarocephalæ.

Gen. Ch. *Receptacle* bristly. *Seed-down* simple. *Corollas of the ray* funnelshaped, longer, irregular. *Willd.*

Centaurea benedicta. Willd. *Sp. Plant.* iii. 2315; Woodv. *Med. Bot.* p. 34. t. 14. The blessed thistle—*carduus benedictus*—is an annual herbaceous plant, the stem of which is about two feet high, branching towards the top, and furnished with long, elliptical, rough leaves, irregularly toothed, barbed with sharp points at their edges, of a bright green colour on their upper surface, and whitish on the under. The lower leaves are deeply sinuated, and stand on footstalks; the upper are sessile, and in some measure decurrent. The flowers are yellow, and surrounded by an involucre of ten leaves, of which the five exterior are largest. The calyx is oval, woolly, and composed of several imbricated scales, terminated by rigid, pinnate, spinous points.

This plant is a native of the South of Europe, and is cultivated in gardens in other parts of the world. It has become naturalized in the United States. The period of flowering is June, when its medicinal virtues are in greatest perfection. The Edinburgh College directs the whole herbaceous part of the plant; the Dublin only the leaves. It should be cut when in flower, quickly dried, and kept in a dry place.

It has a feeble unpleasant odour, and an intensely bitter taste, more disagreeable in the fresh than the dried plant. Water and alcohol extract its virtues. The infusion formed with cold water is a grateful bitter; the decoction is nauseous, and offensive to the stomach. The bitterness remains in the extract, which is said to contain nitrate of potassa. *Fée.*

Medical Properties and Uses. The blessed thistle may be so administered as to prove tonic, diaphoretic, or emetic. The cold infusion, made with half an ounce of the leaves to a pint of water, has been employed as a mild tonic in debilitated conditions of the stomach. A stronger infusion, taken warm while the patient is confined to bed, produces copious perspiration. A still stronger infusion, or the decoction, taken in large draughts, provokes vomiting, and has been used to assist the operation of emetics. The herb, however, is at present little employed, as all its beneficial effects may be obtained from chamomile. The dose of the powder as a tonic is from a scruple to a drachm, that of the infusion two fluidounces. W.

CENTAURII CACUMINA. *Lond.*

Flowering Tops of Common European Centaury.

"Chironia Centaurium. *Cacumina.*" *Lond.*

Off. Syn. CHIRONIÆ CENTAURII SUMMITATES. Summitates florentes. *Ed.;* CENTAUREUM. ERYTHRÆA CENTAUREUM. Folia. *Dub.*

Petite centaurée, *Fr.;* Tausengüldenkraut, *Germ.;* Centaurea minore, *Ital.;* Centaura minor, *Span.*

This plant, first ranked among the *Gentianæ*, and afterwards among the *Chironiæ*, is now placed in a new genus separated from the latter by Persoon, and entitled *Erythræa.* As the *Erythræa Centaurium* it is recognised by the Dublin College.

Erythræa. *Sex. Syst.* Pentandria Monogynia.—*Nat.Ord.* Gentianeæ.

Gen. Ch. *Capsule* linear. *Calyx* five-cleft. *Corolla* funnelshaped, with a short limb withering. *Anthers* often bursting, spiral. *Stigmas* two. *Loudon's Encyc.*

Erythræa Centaurium. Loudon's *Encyc. of Plants*, p. 130.—*Chironia Centaurium.* Willd. *Sp. Plant.* i. 1068; Woodv. *Med. Bot.* p. 275. t. 96.

This is a small, annual, herbaceous plant, rising about a foot in height, with a branching stem, which divides above into a dichotomous panicle, and bears opposite, sessile, ovate lanceolate, smooth, and obtusely pointed leaves. The flowers are of a beautiful rose colour, standing without peduncles in the axils of the stems, with their calyx about half as long as the tube of the corolla. The plant grows wild in most of the countries of Europe, adorning the woods and pastures, during the latter part of summer, with its pretty and delicate flowers.

All the green parts of the plant have a strong bitter taste, which they impart to water and alcohol. The flowering summits are generally preferred, though the Dublin College directs the leaves.

Medical Properties and Uses. The common centaury of Europe has tonic properties very closely resembling those of gentian, with which it is associated in the same natural family. It is employed on the other side of the Atlantic in dyspeptic complaints, and formerly had considerable reputation in the treatment of fever. It was one of the ingredients of the Portland powder. In the United States it has been superseded by the *Sabbatia angularis* or American Centaury. The dose of the powder is from thirty grains to a drachm. Another species of Erythræa—the *E. Chilensis*—possesses similar properties, and is employed to a considerable extent in Chili as a mild tonic. W.

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CERA ALBA. *U. S., Lond., Ed., Dub.*

White Wax.

Cire blanche, *Fr.;* Weisses Wachs, *Germ.;* Cera bianca, *Ital.;* Cera blanca, *Span.*

CERA FLAVA. *U.S., Lond., Ed., Dub.*

Yellow Wax.

Cire jaune, *Fr.;* Gelbes Wachs, *Germ.;* Cera gialla, *Ital.;* Cera amarilla, *Span.*

Wax is one of the products of the common bee, the *Apis mellifica* of naturalists, which constructs with it the cells of the comb in which the honey and larvæ are deposited. It was at one time a doubtful point, whether the insect elaborated the wax by its own organs, or merely gathered it already formed from vegetables. The question was set at rest by Huber, who fed a swarm of bees exclusively on honey and water, and found nevertheless that they formed a comb consisting of wax. This, therefore, is a proper secretion of the insect. It is produced in the form of scales under the rings of the belly. But wax also exists in plants, bearing in this, as in other respects, a close analogy to the fixed oils, which are found in both kingdoms with almost as little discoverable difference as between animal and vegetable wax. It is, however, the product of the bee only that is recognised as officinal by the Pharmacopœias. This is directed in two forms: 1. that of *yellow wax* procured immediately from the comb; and 2. that of *white wax* prepared by depriving the former of its colour. We shall consider these separately, and shall afterwards give a brief account of *vegetable wax.*

1. Cera Flava or *Yellow Wax.* This is obtained by slicing the comb taken from the hive, draining and afterwards expressing the honey, and melting the residue in boiling water, which is kept hot for some time in order to allow the impurities to separate, and either subside or be dissolved by the water. When the liquid cools the wax concretes, and having been removed and again melted in boiling water, is strained and poured into pans or other suitable vessels. It is usually brought to market in round flat cakes of considerable thickness. The druggists of Philadelphia are supplied chiefly from the Western States and North Carolina, especially the latter, and from Cuba. Some of an inferior quality is imported from Africa.

In this state wax has a yellowish colour, an agreeable somewhat aromatic odour, and a slight peculiar taste. To the touch it is rather soft and unctuous, though of a firm solid consistence and brittle. It has a granular fracture; but when cut with a knife presents a smooth glossy surface, the lustre of which is so peculiar as when met with in other bodies to be called waxy. It does not adhere to the fingers, nor to the teeth when chewed, but is softened and rendered tenacious by a moderate heat. Its point of fusion is 142° F.; its specific gravity from 0.960 to 0.965. Its chemical properties will be detailed under the head of white wax. The colour, odour, and taste of yellow wax depend on some principle associated with it, but not constituting one of its essential ingredients.

Various adulterations have been practised, most of which may be readily detected. Meal, earth, and other insoluble substances, are at the same time discovered and separated by melting and straining the wax. When the fracture is smooth and shining instead of being granular, the presence of resin may be suspected. This is dissolved by cold alcohol, while the wax is left untouched. Tallow and suet are detected by the softness they communicate to the wax, and its unpleasant odour when melted.

Yellow wax is used in medicine chiefly as an ingredient of plasters and cerates.

2. CERA ALBA or *White Wax*. The colour of yellow wax is discharged by exposing it with an extended surface to the combined influence of air, light, and moisture. The process of bleaching it is carried on to a considerable extent in the vicinity of Philadelphia. The wax, previously melted, is made to fall in streams upon a revolving cylinder, kept constantly wet, upon which it concretes, forming thin ribband like layers. These, having been removed, are spread upon linen cloths stretched on frames, and exposed to the air and light; care being taken to water and occasionally turn them. In a few days they are partially bleached; but to deprive the wax completely of colour it is necessary to repeat the whole process once, if not oftener. When sufficiently white it is melted and cast into small circular cakes, which are usually four or five inches in diameter, and about one-third of an inch in mean thickness.

The colour may also be discharged by chlorine; but the wax is said to be somewhat altered.

Perfectly pure wax is white, shining, diaphanous in thin layers, inodorous, insipid, harder and less unctuous to the touch than the yellow, soft and ductile at 95° F., and fusible at about 155°, retaining its fluidity at a lower temperature. According to Saussure, its specific gravity in the solid state is 0.966, at 178° F. 0.834, and at 201° 0.8247. By a great heat it is partly volatilized, partly decomposed; and, when flame is applied to its vapour, takes fire and burns with a clear bright light. It is insoluble in water, and in cold alcohol or ether, but is slightly soluble in boiling alcohol and ether, which deposite it in great measure upon cooling. The essential and fixed oils dissolve it with facility; resin readily unites with it by fusion; and soaps are formed by the action of soda and potassa in solution. It is not affected by the acids at ordinary temperatures, but is converted into a black mass when boiled with concentrated sulphuric acid. Its ultimate constituents are carbon, hydrogen, and oxygen. Dr. John ascertained that it consists of two distinct proximate principles, one of which he called *cerin*, the other *myricin*, the former soluble to a considerable extent in boiling alcohol and ether, and of the sp. gr. 0.969, the latter nearly insoluble in alcohol or ether, whether hot or cold, softer and more fusible than cerin, and of about the same sp. gr. as water. M. Delamatherie succeeded in making wax artificially by the action of diluted nitric acid on olive oil.

White wax has been adulterated with white lead and tallow. The former sinks to the bottom of the vessel when the wax is melted; the latter imparts to it a dull opaque appearance, and a disagreeable odour during fusion. Starch has been employed for the same purpose. It may be detected by dissolving the wax in oil of turpentine, in which the starch is insoluble.

Medical Properties and Uses. Wax has little effect upon the system. Under the impression, however, that it sheathes the inflamed mucous membrane of the bowels, it has been occasionally prescribed in diarrhœa and dysentery, and is mentioned by Dioscorides as a remedy in the latter complaint. By Poerner it is highly recommended in excoriations of the bowels, attended with pain and obstinate diarrhœa. His mode of using it is to melt the wax with oil of sweet almonds or olive oil, and while the mixture is still hot, to incorporate it by means of the yolk of an egg with some mucilaginous fluid. The dose is about half a drachm, to be repeated three or four times a day. Another method is to form an emulsion by means of soap; but it is evident that this would be the most energetic ingredient of the mixture. Wax is sometimes used to fill cavities in carious teeth. Its chief employment, however, is in the formation of ointments, cerates, and plasters. It is an ingredient in almost all the officinal cerates, which, indeed, owe their general title to the wax they contain.

3. VEGETABLE WAX. Many vegetable products contain wax, or a substance closely analogous to it, as one of their constituents. It exists in the pollen of numerous plants; and forms the bloom or glaucous powder which covers certain fruits, and the coating of varnish with which leaves are sometimes supplied. In some plants it exists so abundantly as to be profitably extracted for use. Such is the *Ceroxylon Andicola*, a lofty palm growing on the Mountain of Quindiu in the South American Andes. Upon the trunk of this tree, in the rings left by the fall of the leaves, is a coating of wax-like matter, about one-sixth of an inch thick, which is removed by the natives and employed in the manufacture of tapers. It contains, according to Vauquelin, two-thirds of a resinous substance, and one-third of pure wax. (*Fée.*) But the form of vegetable wax in which the druggists of this country are particularly interested, is that derived from the *Myrica cerifera*, and commonly called *myrtle wax*. (See *Bigelow's Am. Med. Bot.* iii. 32.) This is a diœcious, tetrandrous plant, belonging to the natural order *Myriceæ* of Richard and Lindley. Nuttall gives the following generic character. "MASC. *Ament* oblong. *Calyx* ovate scales. *Corolla* none. FEM. *Flower* as the male. *Styles* two. *Drupe* one-seeded." The species is distinguished, according to Michaux, by its wedge-shaped lanceolate leaves, having a few serratures at top; by its barren lax aments; and its spherical, naked, distinct fruit. The *M. Caroliniensis* of *Willd.*, and *M. Pennsylvanica* of *Lamarck*, are perhaps only varieties of this species. The wax myrtle is an aromatic shrub, growing from one to twelve feet in height, and found in almost all parts of the United States from New England to Louisiana. The fruit, which grows in clusters closely attached to the stems and branches, is small, globular, and covered with a whitish coating of wax, which may be separated for use. Other parts of the plant are said to possess medical virtues. The bark of the root is acrid and astringent, and in large doses emetic, and has been popularly employed as a remedy in jaundice. (See *Bigelow's Med. Bot.* and *Thatcher's Dispens.*) The process for collecting the wax is simple. The berries are boiled in water; and the wax, melting and floating on the surface, is either skimmed off and strained, or allowed to concrete as the liquor cools, and removed in the solid state. To render it pure, it is again melted and strained, and then cast into large

cakes. It is collected in New Jersey, but more abundantly in New England, particularly Rhode Island, whence it is exported to other parts of the country.

Myrtle wax is of a pale grayish-green colour, somewhat diaphanous, more brittle and at the same time more unctuous to the touch than beeswax, of a feeble odour, and a slightly bitterish taste. It is about as heavy as water, and melts at 109° F. It is insoluble in water, scarcely soluble in cold alcohol, soluble, with the exception of about thirteen per cent., in twenty parts of boiling alcohol, which deposites the greater portion upon cooling, soluble also in boiling ether, and slightly so in oil of turpentine. In chemical relations it bears a close resemblance to beeswax, and consists, like that product, of cerin and myricin, containing 87 parts of the former and 13 of the latter in the 100. The green colour depends upon a distinct principle, which may be separated by boiling the wax with ether, and allowing the liquid to cool. The wax is deposited colourless, while the ether remains green. It is probable that the bitter taste also depends upon a principle distinct from the wax itself.

Medical Properties and Uses. This variety of wax has been popularly employed in the United States as a remedy for dysentery; and we are told by Dr. Fahnestock, that he found great advantage from its use in numerous cases during an epidemic prevalence of this complaint. He gave the powdered wax in doses of a teaspoonful frequently repeated, mixed with mucilage or syrup. (*Am. Journ. Med. Scien.* ii. 313.) It is occasionally substituted by apothecaries for beeswax in the formation of plasters, and is used in the preparation of tapers and candles. It is somewhat fragrant when burning, but emits a less brilliant light than common lamp-oil.

W.

CEREVISIÆ FERMENTUM. *Lond., Ed., Dub.*

Yeast.

Levure, *Fr.;* Bierhefen, *Germ.;* Fermento di cervogia, *Ital.;* Espuma de cerveza, *Span.*

This is the frothy substance which rises to the surface of beer while fermenting. A similar substance is always produced during the vinous fermentation of saccharine liquids; but the principles of its formation are unknown.

It is flocculent, frothy, somewhat viscid, semi-fluid, of a dirty yellowish colour, a sour vinous odour, and a bitter taste. At a temperature of 60° or 70°, in a close vessel or damp atmosphere, it soon undergoes putrefaction. Exposed to a moderate heat, it loses its liquid portion, becomes dry, hard, and brittle; and may in this state be preserved for a long time. In France it is brought to the solid state by introducing it into sacs, washing it with water, then submitting it to pressure, and ultimately drying it.

Yeast is insoluble in alcohol or water. It was analyzed by Westrumb, and found to contain in 15142 parts, 13 of potassa, 15 of carbonic acid, 10 of acetic acid, 45 of malic acid, 69 of lime, 240 of alcohol, 120 of extractive, 240 of mucilage, 315 of saccharine matter, 480 of gluten, 13595 of water, besides traces of silica and phosphoric acid. Its bitterness is attributable to a principle derived from the hops. The property for which it is chiefly valued is that of exciting the vinous fermentation in saccharine liquids, and the panary fermentation in various farinaceous substances. This property it owes to the azotized principle or gluten which it contains; for if separated from this constituent, it loses its powers as a ferment, and reacquires them upon the subsequent addition of the gluten. By boiling in water it is deprived of the property of exciting fermentation. At an elevated temperature it is decomposed, affording products similar to those which result from the decomposition of animal matters.

Medical Properties and Uses. Yeast has been highly extolled as a remedy in typhoid fevers, and is said to have been given with advantage in hectic. It is, however, little employed; as its somewhat tonic and stimulant effects, ascribable to the bitter principle of hops, the alcohol, and the carbonic acid which are among its constituents, may be obtained with equal certainty from more convenient medicines. Dr. Hewson, of Philadelphia, informs us, that in a case of typhoid fever attended with great irritability of the stomach, the patient was benefitted and sustained by taking a pint of yeast daily for five days, during which period no other remedy was employed. When largely taken, it generally proves laxative; and it may sometimes be necessary to obviate this effect by opium. Externally applied, it is very useful in foul and sloughing ulcers, the fetor of which it corrects, while it affords a gentle stimulus to the debilitated vessels. It is usually employed mixed with farinaceous substances in the form of a cataplasm.

The dose is from half a fluidounce to two fluidounces every two or three hours.

Off. Prep. Cataplasma Fermenti, *Dub.* W.

* * *

CETACEUM. *U. S., Lond., Dub.*

Spermaceti.

"Physeter macrocephalus. Concretum sui generis. *A peculiar concrete substance.*" *U. S.*

Off. Syn. SPERMACETI. Ex physetere macrocephalo. *Ed.*

Blanc de baleine, Spermaceti, Cetine, *Fr.;* Wallrath, *Germ.;* Spermaceti, *Ital.,* Esperma de ballena, *Span.*

The spermaceti whale is from sixty to eighty feet in length, with an enormous head, not less in its largest part than thirty feet in circumference, and constituting one-third of the whole length of the body. The upper part of the head is occupied by large cavities, separated from each other by cartilaginous partitions, and containing an oily liquid, which after the death of the animal, concretes into a white unctuous spongy mass, consisting of the proper spermaceti mixed with oil. This mass is removed from the cavities, and the oil allowed to separate by draining. The quantity of crude spermaceti thus obtained from a whale of the ordinary size, is more than sufficient to fill twelve large barrels. It still, however, contains much oily matter and other impurities, from which it is freed by expression, washing with hot water, melting, straining, and lastly by repeated washing with a weak boiling ley of potash. The common whale oil, and that of other cetaceous animals, contain small quantities of spermaceti, which they slowly deposite on long standing. In the last edition of the United States Pharmacopœia, the example of the London College has been followed in substituting, for the former inaccurate title, the more appropriate and less inelegant appellation of *cetaceum.*

Spermaceti is in white, pearly, semitransparent masses, of a crystalline foliaceous texture; friable, soft and somewhat unctuous to the touch; slightly odorous; insipid; of the sp. gr. 0.943; fusible at 112° F. (*Bostock*); volatilizable at a higher temperature without change *in vacuo*, but partially decomposed if the air is admitted; inflammable; insoluble in water; soluble in small proportion in boiling alcohol, ether, and oil of turpentine, but precipitated as the liquids cool; readily soluble in the fixed oils; forming an imperfect soap when heated with the pure alkalies, by which it is converted into the margaric and oleic acids and a peculiar substance named *ethal* by Chevreul; not affected by the mineral acids, except the sulphuric, which decomposes and dissolves it; rendered yellowish and rancid by long exposure to hot air, but capable of being again purified by washing with a warm ley of potash. By Fourcroy, spermaceti was supposed to be identical with adipocire, but Chevreul proved it to be a distinct principle, and proposed for it the name of *cetin*, which has been adopted in France. As found in the shops it is not entirely pure, containing a fixed oil, and often a peculiar colouring principle. From these it is separated by boiling in alcohol, which on cooling deposites the *cetin* in crystalline scales. In this state it does not melt under 120° F., is soluble in 40 parts of alcohol of the sp. gr. 0.821 (*Thenard*), and is harder, more shining, and less unctuous to the touch than ordinary spermaceti. The ultimate constituents of spermaceti are, according to Berard, carbon 81, oxygen 6, hydrogen 13, in 100 parts; according to Saussure, carbon 75.474, hydrogen 12.795, oxygen, 11.377, and nitrogen 0.354.

Medical Properties and Uses. Like the fixed oils, spermaceti has been given as a demulcent in irritations of the pulmonary and intestinal mucous membranes; but it possesses no peculiar virtues; and its internal use has been generally abandoned. It may be reduced to powder by the addition of a little alcohol or almond oil, or suspended in water by means of mucilage or the yolk of eggs and sugar. Externally it is much employed as an ingredient of ointments and cerates.

Off. Prep. Ceratum Cetacei, *U.S.*, *Lond.*, Ceratum Simplex, *Ed.*; Unguentum Cetacei, *Lond*,, *Dub.* W.

* * *

CHENOPODIUM. *U.S.*

Wormseed.

"Chenopodium anthelminticum. Semina. *The seeds.*" *U.S.*

CHENOPODIUM. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Chenopodeæ.

Gen. Ch. *Calyx* five-leaved, five-cornered. *Corolla* none. *Seed* one, lenticular, superior. *Willd.*

Chenopodium anthelminticum. Willd. *Sp. Plant.* i. 1304; Barton, *Med. Bot.* ii. 183. This is an indigenous perennial plant, with an herbaceous, erect, branching, furrowed stem, which rises from two to five feet in height. The leaves are alternate or scattered, sessile, oblong lanceolate, attenuated at both ends, sinuated and toothed on the margin, conspicuously veined, of a yellowish-green colour, and dotted on their under surface. The flowers are very numerous, small, of the same colour with the leaves, and arranged in long, leafless, terminal panicles, which are composed of slender, dense, glomerate, alternating spikes.

This species of Chenopodium, known commonly by the name of *wormseed*, and *Jerusalem oak*, grows in almost all parts of the United States, but most vigorously and abundantly in the southern section. It is usually found in the vicinity of rubbish, along fences, in the streets of villages, and in the commons about the larger towns. It flowers from July to September, and ripens its seeds successively through the autumn. The whole herb has a strong, peculiar, offensive, yet somewhat aromatic odour, which it retains when dried. All parts of the plant are occasionally employed; but the seeds only are strictly officinal. These should be collected in October.

As found in the shops, they are small, not larger than the head of a pin, irregularly spherical, very light, of a dull, greenish-yellow or brownish colour, a bitterish, somewhat aromatic, pungent taste, and possessed in a high degree of the peculiar smell of the plant. When deprived, by rubbing them in the hand, of a capsular covering which invests them, they present a shining surface of a very dark colour. They abound in a volatile oil, upon which their sensible properties and medical virtues depend, and which is obtained separate by distillation. (See *Oleum Chenopodii.*) The same oil impregnates to a greater or less extent the whole plant.

The seeds of the *Chenopodium ambrosioides*, which is also an indigenous plant, and very prevalent in the Middle States, are said to be used indiscriminately with those of the *C. anthelminticum*. They may be distinguished by their odour, which is weaker and less offensive, and to some persons agreeable. The plant itself is often confounded with the true wormseed, from which it differs in having its flowers in leafy racemes. This species of Chenopodium has been employed in Europe as a remedy in nervous affections, particularly chorea. Five or six cases of this disease, reported by Plenk, yielded, after having resisted the ordinary means, to the daily use of an infusion of two drachms of the plant in ten ounces of water, taken in the dose of a cupful morning and evening, and associated with the employment of peppermint. (Merat and De Lens, *Dict. de Mat. Med.*)

The *C. Botrys*, which is also known by the vulgar name of *Jerusalem oak*, is another indigenous species, possessing anthelmintic virtues. The plant is said to have been used in France with advantage as a pectoral in catarrh and humoral asthma.

Medical Properties and Uses. Wormseed is one of our most efficient indigenous anthelmintics, and is thought to be particularly adapted to the expulsion of lumbrici in children. A dose of it is usually given before breakfast in the morning, and at bed time in the evening, for three or four days successively, and then followed by calomel or some other brisk cathartic. If the worms are not expelled, the same plan is repeated.

The seeds are most conveniently administered in powder, mixed with syrup in the form of an electuary. The dose for a child two or three years old, is from one to two scruples.

The volatile oil is perhaps more frequently given than the seeds in substance, though its offensive odour and taste sometimes render it of difficult administration. The dose for a child is from five to ten drops, mixed with sugar, or in the form of emulsion.

A tablespoonful of the expressed juice of the leaves, or a wineglassful of a decoction prepared by boiling an ounce of the fresh plant in a pint of milk, with the addition of orange-peel or other aromatic, is sometimes substituted in domestic practice for the ordinary dose of the seeds and oil.

W.

CHIMAPHILA. *U.S.*

Pipsissewa.

"Chimaphila umbellata, *Barton.* Pyrola umbellata, *Bigelow.* Herba. *The herb.*" *U.S.*

Off. Syn. PYROLA UMBELLATA. Herba. *Dub.*

Chimaphila. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Pyroleæ.

Gen. Ch. *Calyx* five-toothed. *Petals* five. *Style* very short, immersed in the germ. *Stigma* annular, orbicular, with a five-lobed disk. *Filaments* stipitate; stipe discoid, ciliate. *Capsules* five-celled, opening from the summits, margins unconnected. *Nuttall.*

This genus was separated from the *Pyrola* by Pursh, and is now admitted by most botanical writers. It embraces two species, the *C. umbellata* and *C. maculata*, which are both indigenous, and known throughout the country by the common title of *winter green.* The generic title was founded upon the vulgar name of the plants. It is formed of two Greek words, χειμα winter, and φιλος a friend. The *C. umbellata* only is officinal.

Chimaphila umbellata. Barton, *Med. Bot.* i. 17.—*Pyrola umbellata.* Willd. *Sp. Plant.* ii. 622; Bigelow, *Am. Med. Bot.* ii. 15. The pipsissewa is a small evergreen plant, with a perennial, creeping, yellowish root, which gives rise to several simple, erect or semi-procumbent stems, from four to eight inches in height, and ligneous at their base. The leaves are wedge-shaped somewhat lanceolate, serrate, coriaceous, smooth, of a shining sap-green colour on the upper surface, paler beneath, and supported upon short footstalks, in irregular whorls, of which there are usually two on the same stem. The flowers are disposed in a small terminal corymb, and stand upon nodding peduncles. The calyx is small, and divided at its border into five teeth or segments. The corolla is composed of five roundish, concave, spreading petals, which are of a white colour tinged with red, and exhale an agreeable odour. The stamens are ten, with filaments shorter than the petals, and with large, nodding, bifurcated, purple anthers. The germ is globular and depressed, supporting a thick and apparently sessile stigma, the style being short and immersed in the germ. The seeds are numerous, linear, chaffy, and enclosed in a roundish, depressed, five-celled, five-valved capsule, having the persistent calyx at the base.

This humble but beautiful evergreen is a native of the northern latitudes of America, Europe, and Asia. It is found in all parts of the United States, and extends even to the Pacific ocean. It grows under the shade of woods, and prefers a loose sandy soil, enriched by decaying leaves. The flowers appear in June and July. All parts of the plant are endowed with active properties. The leaves and stems are kept in the shops.

The *C. maculata*, or *spotted winter green*, probably possesses similar virtues with the *C. umbellata.* The character of the leaves of the two plants will serve to distinguish them. Those of the C. maculata are lanceolate, rounded at the base, where they are broader than near the summit, and of a deep olive green colour, veined with greenish white; those of the officinal species are broadest near the summit, gradually narrowing to the base, and of a uniform shining green. In drying, with exposure to light, the colour fades very much, though it still retains a greenish hue.

Pipsissewa, when fresh and bruised, exhales a peculiar odour. The taste of the leaves is pleasantly bitter, astringent, and sweetish; that of the stems and root unites with these qualities a considerable degree of pungency.

Boiling water extracts the active properties of the plant, which are also imparted to alcohol. The constituents, so far as ascertained, are bitter extractive, tannin, resin, gum, lignin, and saline matters. The active principle has not yet been isolated, though it probably exists in the substance called bitter extractive.

Medical Properties and Uses. This plant is diuretic, tonic, and astringent. It was employed by the aborigines in various complaints, especially scrofula, rheumatism, and nephritic affections. From their hands it passed into those of the European settlers, and was long a popular remedy in certain parts of the country, before it was adopted by the profession. The first regular treatise in relation to it that has come to our knowledge, was the thesis of Dr. Mitchell, published in the year 1803; but little was thought of it till the appearance of the paper of Dr. Sommerville, in the 5th vol. of the London Medico-Chirurgical Transactions. By this writer it was highly recommended as a remedy in dropsy; and his favourable report has been sustained by the subsequent statements of many respectable practitioners. It is particularly useful in cases attended with disordered digestion and general debility, in which its tonic properties and general acceptability to the stomach prove highly useful auxiliaries to its diuretic powers. Nevertheless, it cannot be relied on exclusively in the treatment of the complaint; for though it generally produces an increased flow of urine, it has seldom effected cures. Other disorders, in which it is said to have proved useful, are calculous and nephritic affections, and in general all those complaints of the urinary passages for which uva ursi is prescribed. It is very highly esteemed by some practitioners as a remedy in scrofula, both before and after the occurrence of ulceration; and it has certainly proved highly advantageous in certain obstinate ill-conditioned ulcers and cutaneous eruptions, supposed to be connected with a strumous diathesis. In these cases it is used both internally, and locally as a wash.

The decoction is the preparation usually preferred. It is made by boiling two ounces of the fresh bruised leaves with three pints of water to a quart, and given to the amount of a pint in twenty-four hours. The watery extract may be given in the dose of twenty or thirty grains four times a day.

Off. Prep. Decoctum Pyrolæ, *Dub.* W.

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CIMICIFUGA. *U.S. Secondary.*

Black Snakeroot.

“ Cimicifuga racemosa. *Nuttall.* Cimicifuga serpentaria. *Pursh.* Radix. *The root.*” *U.S.*

Cimicifuga. *Sex. Syst.* Polyandria Di-Pentagynia.—*Nat. Ord.* Ranunculaceæ.

Gen. Ch. *Calyx* four or five-leaved. *Petals* four to eight, deformed, thickish, sometimes wanting. *Capsules* one to five, oblong, many-seeded. *Seeds* squamose. *Nuttall.*

Cimicifuga racemosa. Torrey, *Flor.* 219.—*C. serpentaria.* Pursh, *Flor. Am. Sept.* p. 372.—*Actæa racemosa.* Willd. *Sp. Plant.* ii. 1139.—*Macrotys racemosa.* Eaton's *Manual*, p. 288. This is a tall, stately plant, having a perennial root, and a simple herbaceous stem, which rises from four to eight feet in height. The leaves are large, and ternately decomposed, consisting of oblong ovate leaflets, incised and toothed at their edges. The flowers are small, white, and disposed in a long, terminal, wandlike raceme, with occasionally one or two shorter racemes near its base. The calyx is white, four-leaved, and deciduous; the petals are minute, and shorter than the stamens; the pistil consists of an oval germ and a sessile stigma. The fruit is an ovate capsule containing numerous flat seeds.

The *black snakeroot*, or *cohosh* as this plant is sometimes called, is a native of the United States, growing in shady and rocky woods, from Canada to Florida, and flowering in June and July. The root is the part employed.

This, as found in the shops, consists of a thick, irregularly bent or contorted body or caudex, from one-third of an inch to an inch in thickness, often several inches in length, furnished with many slender radicles, and rendered exceedingly rough and jagged in appearance by the remains of the stems of successive years, which to the length of an inch or more are frequently attached to the root. The colour is externally dark brown, almost black, internally whitish; the odour is feeble; the taste bitter, herbaceous, and somewhat astringent, leaving a slight sense of acrimony. The root yields its virtues to boiling water. It was found by Mr. Tilghman, of Philadelphia, to contain gum, starch, sugar, resin, wax, fatty matter, tannin and gallic acid, a black colouring matter, a green colouring matter, lignin, and salts of potassa, lime, magnesia and iron. (*Journ. of Phil. Col. of Pharm.* vi. 20.)

Medical Properties and Uses. Cimicifuga unites, with a tonic power, the property of stimulating the secretions, particularly those of the skin, kidneys, and pulmonary mucous membrane. It is thought also by some to have a particular affinity for the uterus. Its common name was probably derived from its supposed power of curing the disease arising from the bite of the rattlesnake. It is employed chiefly in domestic practice as a remedy in rheumatism, dropsy, hysteria, and various affections of the lungs, particularly those resembling consumption. Several cases of chorea are recorded by Dr. Jesse Young, in which it is said to have effected cures; and the editor of the American Journal of the Medical Sciences states, that he was informed by Dr. Physick that he had known it, in the dose of ten grains every two hours, prove successful in the cure of this complaint in several instances. In the cases recorded by Dr. Young, the powdered root was given in the quantity of a teaspoonful three times a day. (*Am. Journ. of Med. Sciences*, ix. 310.) The medicine is usually administered in the form of decoction. An ounce of the bruised root may be boiled for a short time in a pint of water, and one or two fluidounces given for a dose several times a day. W.

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CINCHONA. *U.S.*

Peruvian Bark.

CINCHONA FLAVA, *Yellow Bark.* CINCHONA PALLIDA, *Pale Bark.* CINCHONA RUBRA, *Red Bark.*

"Cinchona lancifolia, et aliæ. Cortex. *The bark.*" *U.S.*

Off. Syn. CINCHONÆ CORDIFOLIÆ CORTEX. CINCHONÆ LANCIFOLIÆ CORTEX. CINCHONÆ OBLONGIFOLIÆ CORTEX. *Lond.*

CINCHONÆ CORDIFOLIÆ CORTEX. Cortex Cinchonæ flavus.—CINCHONÆ LANCIFOLIÆ CORTEX. Cortex Cinchonæ communis.—CINCHONÆ OBLONGIFOLIÆ CORTEX. Cortex Cinchonæ ruber. *Ed.*

CINCHONA CORDIFOLIA. Cortex. Cinchona flava.—CINCHONA LANCIFOLIA. Cortex. Cinchona officinalis.—CINCHONA OBLONGIFOLIA. Cortex. Cinchona rubra. *Dub.*

Quinquina, *Fr.;* China, Peruvianische Rinde, *Germ.;* China, *Ital.;* Quina, *Span.*

The great importance of Peruvian bark, and the extraordinary degree of attention which it has received, as well from naturalists as from physicians and pharmaceutists, entitle it to a fuller consideration, than, in accordance with the plan of this work, can be given to most other articles of the Materia Medica. Our remarks, therefore, on this subject, will be more than usually extensive; and will embrace many particulars in relation to the natural and commercial history of the drug, which, though not absolutely essential to the full understanding of its properties, are possessed of interest for the inquiring mind, and may lead to useful practical results.

Botanical History.

Though the use of Peruvian bark was introduced into Europe so early as 1640, it was not till the year 1737 that the plant which produced it was known to naturalists. In that year, La Condamine, one of the French Academicians who were sent to South America to make observations relative to the figure of the earth, on his journey to Lima, through the province of Loxa, had an opportunity of examining the tree, of which, upon his return, he published a description in the Memoirs of the Academy. Soon afterwards Linnæus gave it the name of *Cinchona officinalis*, in honour of the Countess of Cinchon, who is said to have first taken it to Europe; but, in his description of the plant, he is stated by Humboldt to have united the species discovered by La Condamine with the *C. pubescens*, a specimen of which had been sent him from Santa Fe de Bogota. For a long time botanists were ignorant that more than one species of this genus existed; and the C. officinalis continued, till a comparatively recent date, to be recognised by the Pharmacopœias as the only source of the Peruvian bark of commerce. A plant was at length discovered in Jamaica, having the generic characters of the Cinchona as then established, and received the title of *C. Caribæa.* Analogous species were afterwards met with in various parts of the West Indies; Forster found one in the island of Tongataboo in the South Pacific, Roxburgh another on the Coromandel coast of Hindostan, Nee a third in the Philippines; many new species were discovered in various parts of New-Granada and Peru by Mutis, Zea, Ruiz and Pavon, Humboldt and Bonpland, and Tafalla; several Brazilian plants appeared to certain botanists worthy of ranking in the same genus; and even the southern portion of our own country, and the distant isles of Bourbon and Mauritius, were made to burthen with their productions the already greatly overloaded catalogue. Not less than forty-six different plants have by various authors been brought under the genus Cinchona; and the number would be greatly augmented, were we to admit as distinct species all the varieties for which this rank is claimed by one or another botanist. But in thus throwing together the productions of so many and such distant climates, botanists compelled an association which nature never intended, which many authors indeed have never admitted, and which is now dissolved by universal consent. According to De Candolle, there exists sufficient ground for distributing these various species into at least eight genera; viz. Cinchona, Buena, Remijia, Exostemma, Pinckneya, Hymenodyction, Luculia, and Danais. These genera all belong to the *Class* and *Order* Pentandria Monogynia; *Nat. Ord.* Rubiaceæ, *Juss.*, *tribe* Cinchonaceæ, and *undertribe* Cinchoneæ of *De Candolle.* The *Cinchona* is confined exclusively to New Granada, Peru, and Bolivia. The *Buena* includes two Peruvian and one Brazilian species, the former of which, before their change of name, were designated as the *Cinchona acuminata*, and *C. obtusifolia.* The genus *Remijia* was established by De Candolle, and embraces three shrubs of Brazil, which were ascribed by Aug. de St. Hilaire to the Cinchona, and the bark of which is used as a febrifuge by the natives of the country. To the *Exostemma* belong the West India species, of which there are not less than nine, formerly known as the *Cinchona Caribæa*, *C. floribunda*, &c. To the same genus belong the former *Cinchona Philippica* of the Philippine islands, the *C. corymbifera* of Tongataboo, four species indigenous to Peru, and two discovered by M. de St. Hilaire in Brazil. The *Pinckneya* consists of a single species, inhabiting Georgia and South Carolina, discovered by Michaux the elder, and described in some botanical works by the name of *Cinchona Caroliniana.* The *Hymenodyction* is an East India genus, including the *Cinchona excelsa* of Roxburgh, found on the Coromandel coast. The *Luculia*, of which there is but one species—the *Cinchona gratissima* of Roxburgh's Flora Indica—inhabits the mountains of Nepaul. The *Danais* embraces the *Cinchona Afro-Inda* of Willem.; growing in the Isle of France. Of these various genera, the *Cinchona*, *Buena* or Cosmibuena of Ruiz and Pavon, and the *Exostemma*, have been most generally confounded. The last, however, is decidedly distinguished by the projection of the stamens beyond the corolla, a character expressed in the name of the genus. The two former are still frequently combined by scientific writers. The *Buena* was originally suggested as a distinct genus by Ruiz and Pavon, has been recognised by De Candolle and some other authors, and appears to be sufficiently characterized. Its chief peculiarities are the shape of the corolla, the separation of the calyx from the fruit at maturity, and the opening of the capsule from above downwards. We have briefly noticed these genera, which have at various times been confounded with the true Cinchona, because the barks of some of them have been occasionally substituted in pharmacy for the genuine febrifuge of Peru. We shall now proceed to consider the proper Cinchona.

CINCHONA. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Cinchonaceæ.

Gen. Ch. *Calyx* with the tube turbinate, the limb five-cleft, persistent. *Corolla* with the tube terete, and the limb divided into five oblong lobes. *Stamens* five; filaments short and inserted in the middle of the tube; anthers linear, entirely included. *Stigma* bifid, somewhat club-shaped. *Capsule* ovate or oblong, marked with a furrow on each side, two-celled, crowned with the calyx, opening from below upwards. *Seeds* numerous, erect, imbricated upwards, compressed, furnished with a membranous margin.

The plants composing this genus are trees or shrubs. The leaves are opposite, upon short petioles, with flat margins, and are attended with ovate or oblong, foliaceous, free, deciduous stipules. The flowers are terminal, in corymbose panicles, and of a white or purplish rose colour. *De Candolle.*

It has been stated that the genuine cinchona trees are confined exclusively to the continent of South America. Within these limits, however, they are very widely diffused, extending from La Paz, in the former vice-royalty of Buenos Ayres, to the mountainous regions of Santa Martha on the northern coast. Those which yield the bark of commerce grow at various elevations upon the Andes, seldom less than 4000 feet above the level of the sea; and require a temperature considerably lower than that which usually prevails in tropical countries.

There appears to have been much difficulty in arranging the plants belonging to this genus into their appropriate species; and botanists have not only differed among themselves on this point, but have in some instances exhibited a degree of excitement unbecoming the dignity of science. Ruiz and Pavon, in the Flora Peruviana, describe thirteen new species, while Mutis reduced the number to seven, and Professor Zea has attempted to prove, that almost all the efficacious species of Ruiz and Pavon are reducible to the four described by Mutis in the year 1793, in the Literary News of Santa Fe de Bogota. It appears, from the best testimony, that the number of the species has been unnecessarily augmented by certain botanists; mere fugitive differences, depending on peculiarities of situation or growth, having been exaggerated into permanent characteristics. One source of the difficulty of a proper discrimination is stated by Humboldt to be the varying shape of the leaves of the same species, according to the degree of elevation upon the mountainous declivities, to the severity or mildness of the climate, the greater or less humidity of the soil, and to various circumstances in the growth of individual plants. Even the same tree often produces foliage of a diversified character; and a person not aware of this fact, might be led to imagine that he had discovered different species from an examination of the leaves which have grown upon one and the same branch. The fructification partakes, to a certain extent, of the same varying character; and the difficulty is thus still further augmented.

Lambert, in his "Illustration of the genus Cinchona," published in the year 1821, after admitting with Humboldt the identity of several varieties which had received specific names from other botanists, describes nineteen species exclusive of the two Peruvian *Buenæ*. De Candolle enumerates only sixteen well ascertained species.

In the present state of our knowledge, it is impossible to decide from which species of Cinchona the several varieties of bark are respectively derived. The former references of the yellow bark to the *C. cordifolia*, of the pale to the *C. lancifolia*, and of the red to the *C. oblongifolia*, have been very properly abandoned in the last edition of the U. S. Pharmacopœia, though still retained in those of Great Britain. We shall have occasion hereafter to show, that the valuable barks which are now known in the market by these titles, are, at least in two of the three instances, not the product of the species to which they have been ascribed. It is stated by Humboldt, that the property of curing agues belongs to the barks of all the cinchonas with hairy and woolly blossoms, and to those alone. In Lambert's catalogue this division includes seventeen species. We shall notice the most prominent, mentioning also the synonymes employed by different authors.

In relation to two of the species—*C. Condaminea* and *C. lancifolia*—not a little difference of opinion has existed. The name *lancifolia* was applied by Mutis to a tree, first noticed by himself, which flourishes in the neighbourhood of Santa Fe de Bogota, and the bark of which is known at that place by the title of *cascarilla naranjanda*, or orange-coloured bark. From specimens which he received of the Cinchona originally observed by Condamine, from which the celebrated *Cascarilla fina de Uritusinga* was derived, he was induced to consider this tree as identical with the C. lancifolia. But Loxa, in the vicinity of which this fine bark is collected is separated from Bogota, the residence of Mutis, and the locality of his C. lancifolia, by no less than eight degrees of latitude, and was never visited by this botanist; so that he had no opportunity of personally inspecting the plant in its natural state.

While Mutis, five hundred miles to the north of Loxa, was thus identifying the *cascarilla fina* with his own *cascarilla naranjanda*, Ruiz was claiming for his *C. nitida*, which grows at an almost equal distance to the south of that place, the honour of being the plant seen and described by La Condamine. But Ruiz also laboured under the disadvantage of never having visited Loxa, and like Mutis was compelled to form his opinion upon uncertain grounds. Humboldt and Bonpland, who were themselves in that neighbourhood, and had the opportunity of personally inspecting the tree in its native forests, assert that it is neither the *lancifolia* of Mutis nor the *nitida* of Ruiz and Pavon—plants which have since been satisfactorily ascertained to be identical—but a distinct species never before accurately described, which they name, in honour of its first observer, *Condaminea.* Lambert, however, gives his opinion in favour of Mutis, stating that the *scrobiculi* on the leaves, which Bonpland regarded as a permanent differential character, are found more or less numerous in all the species of the genus. Much weight is due to the opinion of this botanist, as he had specimens of both plants before him. Dr. A. T. Thomson in his Dispensatory states, that the C. Condaminea, if not precisely the same with the C. lancifolia, is evidently a variety of that species; and M. Guibourt, in a report presented to the Society of Pharmacy at Paris, coincides with Lambert. If this opinion can be relied on, the C. lancifolia would appear to be very widely spread over the mountainous regions of New Granada and Peru; for Bogota, where it was found by Mutis, is between 4° and 5° of north latitude; while the forests of Huamalies and Xauxa, where the C. nitida of Ruiz and Pavon, now acknowledged to be identical with it, was observed, are from 10° to 12° south of the equator; and the C. Condaminea occupies an intervening station between these two extremes. To this species are also reduced, by the best authors, the *C. glabra* and *C. angustifolia* of the Quinologia of Ruiz, and the *C. lanceolata* of the Flora Peruviana. But giving its due weight to the authority of Mutis, supported by the botanists who have been mentioned, it is impossible not to hesitate, unless with ampler means of forming a correct opinion than we are at present possessed of, in pronouncing Humboldt and Bonpland to have been mistaken; for these celebrated travellers, from their abundant opportunities of personal inspection, from their access to all the knowledge of their predecessors, and from their high scientific qualifications and habits of observation, are indisputably among the first authorities at present existing on the subject of the natural history of the Cinchona. In the remarks, therefore, which follow, the C. Condaminea of Humboldt and Bonpland, and the C. lancifolia of Mutis, will be considered separately, without any decided opinion being pronounced as to the identity of their botanical characters. It is proper, in the present place, to observe, that the causes which tend to perplex botanists in arranging the different species of the genus Cinchona, are particularly applicable to the individual case before us; as, in the language of Humboldt, "the C. Condaminea varies amazingly in its leaves."

1. *C. Condaminea.* Humb. et Bonpl. *Pl. Equin.* i. p. 33. t. 10; De Cand. *Prodrom.* iv. 352. This tree, when full grown, has a stem about eighteen feet high and a foot in thickness, with branches arranged in opposite pairs, of which the lower are horizontal; the higher rise upwards at their extremities. The bark of the trunk is of an ash-gray-colour, with clefts or fissures, and yields on incision a bitter astringent juice; that of the small branches has a greenish hue, is smooth and glossy, and easily separable from the wood. The leaves are oblong, generally when full grown about four inches in length by less than two in breadth, acuminate at both extremities, of a

shining lively green colour, and furnished with glands upon their upper surface, with corresponding scrobiculi or depressions upon the under. In very young plants they are much broader in proportion to their length; and it is an observation of Humboldt, that the older the tree, the narrower is the leaf. The corolla has a rose-coloured tube, and a woolly border, snow white upon its upper surface. The capsules are ovate, and twice as long as they are broad. The tree grows under the fourth degree of south latitude, on the declivities of the mountains, at an elevation of from about one mile to a mile and a half, and in a mean temperature of 67° of Fahrenheit. It is confined to the neighbourhood of Loxa, and produces the variety of bark commonly known by the name of *crown bark of Loxa.*

2. *C. lancifolia.* Mutis, *Period. de Santa Fe*, p. 465; De Cand. *Prodrom.* iv. 352.—*C. nitida*, Ruiz and Pavon, *Fl. Peruv.* ii. 50. t. 191.—*C. lanceolata. Ibid.* iii. 1. t. 223.—*C. angustifolia.* Ruiz, *Quinolog. Suppl.* p. 14. The variety of this species discovered by Mutis in New Granada is a very handsome tree, from thirty to forty-five feet in height, with a trunk from one to four feet in diameter. The leaves are obovate lanceolate, very smooth on both sides, and without glands; the flowers are in large brachiate panicles; the corolla is silky externally; and the capsules are oblong, smooth, and of a length five times greater than their breadth. The tree is quite solitary, never clustering like other Cinchonæ of the same neighbourhood, which are often so crowded together as to form almost closely connected shrubberies. This solitary character appears to pertain to all the more valuable species, and has led to their scarcity in the regions where bark has been long collected. When a tree has been felled, no suckers, as in the inferior species, arise from the roots, and assist to propagate the plant. Perhaps the superiority in size of the full grown C. lancifolia of Mutis over the C. Condaminea as described by Humboldt, is attributable to the fact, that the bark has been gathered in Loxa from the earliest periods of its uses as a medicine, while in New Granada, the commerce in the drug is comparatively of recent date. The C. lancifolia requires a colder climate than the C. Condaminea, growing between the fourth and fifth degrees of north latitude, at an elevation upon the mountains of from 4500 to near 10,000 feet, and in a mean temperature of 61° of Fahrenheit. In the highest situations in which it is found, the thermometer often sinks to 50°, and in the nights is sometimes at the freezing point. Judging from the botanical characters of this species as given by Mutis, it scarcely differs from the C. Condaminea, unless we consider the absence of glands upon the leaves as sufficiently distinctive. That it yields the same kind of bark is to be inferred from the fact, that the *Cascarilla fina de Uritusinga* or Crown bark of Loxa, admitted to be the product of the C. Condaminea, was considered by the experienced Mutis as identical with the *cascarilla naranjanda*, derived from his C. lancifolia; while Ruiz and Pavon, without any communication with Mutis, and at the distance of nearly a thousand miles, claimed a similar identity for the bark of their C. nitida, now generally acknowledged to be the same tree with the C. lancifolia. The Crown bark of Loxa is universally ranked among the pale barks, while that of the C. lancifolia, growing near Bogota, is called *orange coloured;* and this difference of title might appear to indicate a difference in their nature; but the difficulty vanishes when we consider, that the latter name was derived from the colour of the internal surface of the bark, the former from that of the powder; and that the pale barks are orange coloured in their natural state. It is probable that much of the pale bark of commerce, is derived from varieties of the C. lancifolia.

3. *C. cordifolia.* Mutis, *ex Humb. Magaz. Berlin*, 1807, p. 117; Lambert, *Illustration, &c.*, 1821, p. 4. This is a spreading tree, fifteen or twenty feet high, rising on a single erect round stem, which is covered with a smooth bark of a brownish-gray colour. The smaller branches have a lighter coloured bark, and are covered with a fine down. The leaves vary much in form; but some of a heart-shape are to be found on almost every branch, and have given origin to the name of the species. They are usually roundish ovate, about nine inches long, smooth and shining on the upper surface, ribbed and pubescent on the under. The down upon the leaves and smaller branches has given rise to the name of *velvet bark*, by which the tree is known to the common people of New Granada. The flowers are in spreading, brachiate, pubescent panicles. The teeth of the calyx are roundish and somewhat mucronate. The capsules are ovate, oblong, cylindrical, and without ribs.

This species was first described by Mutis, who found it in the mountains about Santa Fe de Bogota; and it is said to flourish also in those of Loxa, Cuenca, and the ancient kingdom of Quito. Like the other medicinal species, it grows in the elevated plains, and on the declivities of the Andes at heights varying from 5800 to 9500 feet.

In the British Pharmacopœias, the C. cordifolia is recognised as the source of the officinal yellow bark. It undoubtedly produces the variety known to the Spaniards as the *quina amarilla* or yellow bark of Santa Fe; but this is by no means the article which circulates in the commerce of this country, England, and France, by the name of *yellow bark* or *Calisaya bark*, and which is so largely consumed in the manufacture of the sulphate of quinia. This will be rendered obvious at once by the statement, that the valuable yellow or Calisaya bark is derived exclusively from the western coast of South America on the Pacific; while the C. cordifolia of Mutis flourishes most about Bogota, of which the commercial outlet is Carthagena on the northern coast of the continent. The truth seems to be that this species yields the yellow Carthagena bark, which is probably identical with the *quina amarilla de Santa Fe* of the Spaniards; and the British Colleges have simply followed Mutis in ascribing the yellow bark to the C. cordifolia, without taking into consideration the total want of similarity, except in the shade of colour, between the medicine known to him by that title, and the valuable variety which they intended to adopt as officinal. The yellow bark described by Thomson in the London Dispensatory as derived from the C. cordifolia, is in all respects identical with the *Calisaya*, and totally different from the yellow Carthagena bark, which is probably the real product of this species. In the United States Pharmacopœia this error of the British Colleges has been corrected.

By some authors the *C. pubescens* of Vahl, and the *C. hirsuta* of the Flora Peruviana, are considered mere synonymes of the *C. cordifolia.*

4. *C. pubescens.* Vahl, *in Act. Havn.* i. p. 19. t. 2; Lambert, *Monog.* t. 2.—*C. ovata.* Ruiz and Pavon, *Flor. Peruv.* ii. p. 52. t. 195. This was described and named by Vahl, who received his specimen from the collection of Jussieu at Paris, whither it was brought by Joseph de Jussieu from the neighbourhood of Loxa. It is admitted to be identical with the *C. ovata* of the Peruvian Flora, even by the authors of that work. Bonpland has pronounced it to be the same with the *C. cordifolia;* but Lambert, though he admits their similarity, decides, from dried specimens in his possession, that they are quite distinct. The C. pubescens differs, according to this botanist, from the C. cordifolia, in having longer petioles, the teeth of the calyx less broad and round, the filaments not more than half the length, and the

capsules obscurely ribbed and tomentose, while those of the C. cordifolia are smooth and ribless. The tree grows about Loxa, also in the warmer regions of the Andes near Pozuzo and Panao, and in the forests of Huanuco to the north-east of Lima. It contributes to furnish the bark of commerce, though we are wholly unable to ascertain the particular variety it affords. Ruiz calls its product *cascarilla palido;* and it is not improbable that a portion of the pale bark of Loxa and Lima is derived from it.

5. *C. hirsuta.* Ruiz and Pavon, *Flor. Peruv.* ii. p. 51. t. 192. Humboldt, upon the authority of Zea, erroneously referred this species to the C. cordifolia; and the error has been copied by De Candolle. The two species have not the least resemblance; and Zea himself has acknowledged his mistake. (*Lambert's Illustration.* A. D. 1821, p. 10.) The C. hirsuta derives its name from the stiff hairs upon its extreme branches, leaves, and flowers. The leaves are oval and acute at the base; the flowers glomerate; the segments of the calyx lanceolate and acuminate; and the capsules ovate. It grows in lofty and cold situations upon the Peruvian Andes near Pillao and Acomayo. It attains the height of about fifteen feet, and is then surrounded by shoots springing upwards from its roots, and forming with the parent tree an oval surface, having the appearance of a dome. Its bark is called *delgada* or slender, is very thin, and may be ranked among the pale varieties of English and American pharmacy, the gray of the French. Though a valuable bark, it is seldom gathered, as its extreme fineness renders its collection much less profitable than that of the larger varieties.

6. *C. scrobiculata*, Humb. and Bonpl. *Plant. Equin.* i. p. 165. t. 47; De Cand. *Prodrom.* iv. 352. This is a large tree, attaining the height of forty feet, with oval oblong leaves, from four to twelve inches in length and from two to six in breadth, acute at each end, smooth, shining on the upper surface, and marked on the under with scrobiculi at the axils of the veins. The tube of the corolla is externally pubescent and the limb woolly. The capsule is ovate oblong, with a breadth equal to one-third of its length. The tree was originally described by Humboldt and Bonpland, who found it growing in great abundance on the mountains near the city of Jaën de Bracomoros, where it forms immense forests. They inform us that the bark of its younger branches so much resembles that of the C. Condaminea, that it is difficult to distinguish the two varieties. It cannot, therefore, as stated by De Candolle, be one of the red barks of commerce; for the product of the C. Condaminea is universally classed among the pale or gray barks. It is called by the natives *cascarilla fina*, and probably contributes to form the packages which come to us under the name of Loxa bark.

7. *C. purpurea.* Ruiz and Pavon, *Flor. Peruv.* ii. p. 52. t. 193; De Cand. *Prodrom.* iv. p. 353. Lambert unites this species with the C. scrobiculata of Humb. and Bonp., retaining the present title; but the species are generally considered distinct. The leaves are broadly oval, somewhat wedge-shaped at the base, subcuspidate at the apex, smooth above, slightly pubescent on the veins beneath, and inclining to a purple colour. The flowers are purplish-white, subcorymbose, and disposed in large brachiate panicles. The corolla is slightly tomentose on the outside, with the limb hirsute internally. The capsules are ovate oblong, about an inch in length, a quarter of an inch in breadth, and marked with longitudinal nerves. The tree grows in the Peruvian Andes, near Chinchao, Pati, &c. Its bark is brown on the outside, light brown within, and is called by the natives *Cascarilla boba de hojà morada*, or simply *Cascarilla morada.* It is probably among those derived from Lima, which is the entrepot of the trade in bark from the interior of Peru about Huanuco, &c.

8. *Cinchona oblongifolia.* Mutis, *Mss. ex Humb. Mag. Berl.* i. p. 118. Lambert, *Illust.* 1821. p. 12. This is one of the largest trees of the genus, rising to a great height on a single, erect, round stem, which is covered with a smooth, brownish, ash-coloured bark. The leaves are oblong or cordate, rough, thickly covered with hairs, and of great size, being frequently one or two feet in length. The flowers are in brachiate corymbose panicles. The corolla is pilose, with linear segments; the anthers three times as long as the filaments. The capsules are ovate. This tree was discovered by Mutis in New Granada, where it is very abundant, especially in the vicinity of Mariquita, in about four degrees of N. latitude. It grows at an elevation of from 4000 to 8500 feet. Botanists generally agree with Humboldt and Bonpland in uniting with this species the *C. magnifolia* of the Flora Peruviana, which grows to the south of the equator, upon the mountains of the Panatahuas, near Cuchero, Chinchao, and Chacahuassi, where it was seen by Ruiz and Pavon, in the year 1780. Lambert, however, describes them as different species, having found the characters of each distinct and constant in the specimens in his possession. He states that the C. oblongifolia is distinguished from the C. magnifolia "by its leaves being rounded at the base, often cordate, covered on both sides with rough pilose tomentum. Sometimes, however, the older leaves become nearly naked above. The corolla is covered on the outside with bristly pilose hairs, while that of *magnifolia* has short pubescence. The laciniæ are also much narrower, the style is enclosed with the stamens in the tube of the corolla. The lobes of the stigma are cylindrical, and the capsules are ovate; those of *magnifolia* are linear and cylindrical." *Illustration,* &c., 1821. p. 12.

The C. oblongifolia is called by the natives *cascarilla de flor de azahar,* from the resemblance of its flowers in odour to those of the orange. Till very recently it has been considered as indisputably the source of the best red bark of commerce, which is ascribed to it by the British Pharmacopœias. A little reflection might have convinced those acquainted with the commerce in bark, that this reference was incorrect; for who ever hears of the officinal red bark as coming from Carthagena? and yet this is the port from which the product of the C. oblongifolia, growing in New Granada, is shipped. The mistake originated in that implicit acquiescence with which the statements of Mutis have been received. The tree does, undoubtedly, as asserted by Mutis, produce a red bark; but it is the red Carthagena bark, a comparatively valueless variety, wholly distinct from the genuine red bark, brought from the Pacific and so highly esteemed as a febrifuge. We shall have occasion to say more on this subject hereafter.

9. *C. macrocarpa.* Vahl *in Act. Havn.* i. p. 20. t. 3; De Cand. *Prodrom.* iv. 354.—*C. ovalifolia. Mutis.* This is a shrub about nine feet in height, with elliptical coriaceous leaves, very smooth on the upper surface, somewhat hirsute pubescent beneath. The flowers are in trichotomous panicles. The corolla is externally pubescent, but hirsute on the inner surface of its segments. The capsules are cylindrical, and twice as long as they are broad. This species inhabits the provinces of Loxa and Cuenca, where it forms considerable forests. It was also found by Mutis in New Granada, and grows as far north as Santa Martha. The variety found in the latter locality has leaves smooth on both sides. The tree derived its name from the extraordinary magnitude of its fruit. Its bark is called by the Spaniards *quina blanca,* or white bark, probably from the colour of the epidermis. May not this species be the source of that commercial variety of cinchona

brought from Maracaybo and Santa Martha, in the neighbourhood of which the tree is said by Humboldt to be found?

The species of Cinchona above enumerated are the most interesting, whether from the attention they have attracted or from the value of their products. Several others probably furnish more or less of the bark of commerce. Among these may be mentioned, 10. *C. micrantha* of the Peruvian Flora, a large and handsome tree found by Tafalla, growing in the elevated regions of San Antonio Playa Grande in the Peruvian Andes, and furnishing a bark called *cascarilla fina* by the natives; 11. *C. glandulifera* of the same work, a shrub with several stems about twelve feet high, flourishing in the country to the north of Huanuco, where it is called *cascarilla negrilla;* 12. *C. ovalifolia* of Humboldt and Bonpland, the *C. Humboldtiana* of Rœm. and Schult., a shrub from six to nine feet high, inhabiting the province of Cuenca, where it forms considerable forests, and is called by the natives *cascarilla peluda* or hairy bark; 13. *C. caduciflora* of Humboldt and Bonpland, a very large tree, more than one hundred feet high, growing near the city of Jaen de Bracomoros, and yielding a bark called *cascarilla bova* by the Peruvians; 14. *C. acutifolia* of the Fl. Peruv., a tree twenty-four feet high, discovered by Tafalla in the Peruvian mountains north of Huanuco, near the Taso, and yielding the *cascarilla hoja aguda;* and 15. *C. dichotoma*, which grows to the height of fifteen feet, was discovered by the same botanist in the same region as the preceding species, and affords the bark called *cascarilla aharquilla* by the natives.

Besides these species, several others might be added, which, though named and described by botanists, are not known to furnish any of the bark of commerce. Such are the *C. macrocalyx*, *C. pelalba* and *C. crassifolia* of Pavon, quoted by De Candolle; and the *C. Pavonii*, *C. Humboldtiana*, *C. rotundifolia*, and *C. stenocarpa* described by Lambert, upon the authority of Pavon, and from specimens in his own possession.*

In all the preceding species except the *C. caduciflora*, the corolla is more or less hairy or woolly: the *C. rosea* is the only other strictly belonging to this genus which has the corolla entirely smooth. It rises usually to the height of fifteen feet, and when in blossom presents a very handsome appearance, as well from the richness of its foliage, as from the beauty of its flowers, with which the natives adorn their churches. It inhabits the forests of the Andes near Pozuzo and San Antonio de Playa Grande. Its bark is called *cascarilla parda*.

Commercial History.

For more than a century after Peruvian bark came into use, it was procured almost exclusively from Loxa and the neighbouring provinces. In a memoir published A. D. 1738, La Condamine speaks of the bark of Rhiobamba, Cuenca, Ayavaca, and Jaën de Bracomoros. Of these places, the first two, together with Loxa, lie within the ancient kingdom of Quito, at its southern extremity; the others are in the same vicinity, within the borders of Peru. The drug was shipped chiefly at the Port of Payta, from which it was carried to Spain, and thence spread over Europe. Beyond the limits above mentioned, the Cinchona was not supposed to exist, till, in the year 1753, a gentleman of Loxa, familiar with the aspect of the tree, discovered it while on a journey from the place of his residence to Santa Fe de Bogota, in numerous situations along his route, wherever, in fact, the elevation of the country was equal to that of Loxa, or about 6,500 feet above the level of the sea. This discovery extended quite through Quito into the kingdom of New Granada, as far as two degrees and a half north of the equator. But no practical advantage was derived from it; and the information lay buried in the archives of the vice-royalty, till subsequent events brought it to light. To Mutis undoubtedly belongs the credit of making known the existence of the Cinchona in New Granada. He first discovered it in the neighbourhood of Bogota, in the year 1772. A botanical expedition was some time afterwards organized by the Spanish government, with the view of exploring this part of their American dominions, and the direction was given to Mutis. The researches of the expedition eventuated in the discovery of several species of the Cinchona in New Granada, and a commerce in the bark soon commenced, which was afterwards increased, and carried on with great vigour through the ports of Carthagena and Santa Martha. The English and North Americans, opening a contraband trade with these ports, were enabled to undersell the Spanish merchant, who received his supplies by the circuitous route of Cape Horn; and the barks of New Granada were soon as abundant as those of Loxa in the markets of Europe.

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* Much weight has been given, in these remarks upon the different species of Cinchona, to the authority of Lambert, who, independently of his familiarity with the subject, resulting from long attention to it, has had opportunities enjoyed by few other botanists of coming to correct conclusions—having in his possession numerous dried specimens of all the species collected by Ruiz and Pavon and their pupils, besides many others derived from other sources.

To these sources another was added about the same time, A. D. 1776, by the discovery of the Cinchona in the centre of Peru, in the mountainous region about the city of Huanuco, which lies on the eastern declivity of the Andes, to the north-east of Lima, at least six degrees to the south of the province of Loxa. To explore this new locality, another botanical expedition was set on foot, at the head of which were Ruiz and Pavon, the distinguished authors of the Flora Peruviana. These gentlemen spent several years in this region, during which time they discovered numerous species that were afterwards described in their Flora. Several of their species, however, are now considered identical with the C. lancifolia previously described by Mutis. Lima became the entrepot for the barks collected around Huanuco; and hence probably originated the name of Lima bark, so often conferred, in common language, not only upon the varieties received through that city, but also upon the medicine generally.

Soon after the last mentioned discovery, two additional localities of the Cinchona were found, one at the northern extremity of the continent near Santa Martha, the other very far to the south, in the provinces of La Paz and Cochabamba, then within the vice-royalty of Buenos Ayres, now attached to the republic of Bolivia. These latter places became the source of an abundant supply of excellent bark, which received the name of Calisaya, probably from a district of country where it was gathered. It was sent partly to the ports on the Pacific, partly to Buenos Ayres.

The consequence of these discoveries, following each other in such rapid succession, was a vast increase in the supply of bark, which was now shipped from the ports of Guayaquil, Payta, Lima, Arica, Buenos Ayres, Carthagena, and Santa Martha. At the same time the average quality was probably deteriorated; for though many of the new varieties were possessed of excellent properties, yet equal care in superintending the collection and assorting of the article could not be exercised now that the field was so extended, as when it was confined to a small portion of the South of Quito and North of Peru. The varieties which were poured into the market soon became so numerous as to burthen the memory, if not to defy the discrimination of the druggist; and the best pharmaceutists found themselves at a loss to discover any permanent peculiarities, which might serve as the basis of a proper and useful classification. This perplexity has continued more or less to the present time; though the discovery of the new alkaline principles has presented a ground of distinction which was before unknown. The restrictions upon the commerce with South America, by directing the trade into irregular channels, had also a tendency to deteriorate the character of the drug. In the complexity of contrivance to which it was necessary to resort to deceive the vigilance of the government, little attention could be paid to a proper assortment of the several varieties; and not only were the best barks mixed with those of inferior species and less careful preparation, but the products of other trees, bearing no resemblance to the Cinchona, were sometimes added, having been artificially prepared so as to deceive a careless observer. The markets of this country were peculiarly ill furnished. The supplies being derived chiefly, by means of a contraband trade, from Carthagena and other ports of the Spanish Main, or indirectly through the Havana, were necessarily of an inferior character; and the little good bark which reached us was imported by our druggists from London, whither it was sent from Cadiz. A great change, however, in this respect, has taken place since the ports on the Pacific have been opened to our commerce. The best kinds of bark have thus been rendered directly accessible to us; and increased intelligence in the community has co-operated with the facility of supply, to exclude from our markets that kind of trash with which they were formerly glutted. Our ships trading to the Pacific, run along the American coast from Valparaiso in Chili to Guayaquil on the western coast of Colombia, stopping at the intermediate ports of Coquimbo, Copiapo, Arica, Callao, Truxillo, &c., from all which they probably receive supplies of bark in exchange for the mercury, piece-goods, flour, &c., which constitute their outward cargo.

The persons who collect the bark are called in South America *Cascarilleros*. Considerable experience and judgment are requisite to render an individual well qualified for this business. He must not only be able to distinguish the trees which produce good bark from those less esteemed, but must also know the proper season and the age at which a branch should be decorticated, and the marks by which the efficiency or inefficiency of any particular product is indicated. The dry season, from September to November inclusive, is the harvest of the bark gatherers. They separate the bark by making a longitudinal incision with a sharp knife through its whole thickness, and then forcing it off from the branch with the back of the instrument. Other means are resorted to when the trunk or larger limbs are decorticated. They consider the branch to be sufficiently mature, when the inner surface of the bark begins to redden upon exposure to the air within three or four minutes after its removal. The next object is to dry the bark in the sun. In the drying process it rolls itself up, or in technical language becomes quilled, and the degree to which this effect takes place, is proportionate directly to the thinness of the bark, and inversely to the age of the branch from which it was derived. In packing the bark for exportation, due care is seldom taken to assort the varieties according either to the species of Cinchona by which they are furnished, or to their resemblance in appearance and character; and it often happens that several different kinds are introduced into the same case. The packages are, in commercial language, called *seroons.* As found in this market, they are usually covered with a case of thick and stiff ox-hide, which is lined within by a very coarse cloth, apparently woven out of some kind of grass.

Means of distinguishing good bark. To the druggist and apothecary it is highly important to possess the means of deciding upon the relative value of the numerous varieties of bark of every quality brought into market, or at least of discriminating between the energetic and inefficient. The following rules are given by men who pretend to a familiar acquaintance with the subject. They are essentially the same with those which, according to Dr. Devoti, a physician of Lima, are practised in South America in choosing the barks proper to be admitted into commerce.

In forming a judgment, it is necessary to consider whether the bark has been taken from a branch of the proper age, and whether it has been carefully dried. Very young bark has not acquired the virtues which render the medicine valuable; that derived from the trunk or older branches has often been injured by time or by the action of parasitic plants; and, to hasten the drying process in certain mountainous situations where the sun has little power, or to increase the rolling, a certain degree of which renders the drug more saleable to the merchants, it is said not to be an uncommon practice to expose the fresh barks injuriously to artificial heat. Bark more than an inch and a half in diameter must have come from the trunk or great branches, that which is smaller than a goosequill from young and immature branches; and both are deemed of inferior quality. The same remark is applicable to the degree of thickness; but in forming a judgment on this point it is necessary to take the species into consideration. Though, as a general rule, very thin or very thick bark is of inferior quality, yet specimens have been found very effectual upon trial, which have not fallen within the limits usually considered the most proper in this respect. That which exceeds a line in thickness is not approved at Cadiz. The specific gravity of bark is also considered, in some measure, a criterion of its value, the heaviest being most esteemed. The fracture should be to a certain extent splintery; if sharp and short it indicates too great age; if the fibres are very long, there is reason to apprehend a want of maturity. The rolling of a bark affords another ground of judgment, though by no means to be relied on, as some excellent varieties are almost or quite flat. A feeble rolling indicates a bark too old or too slowly dried; a spiral form, one that has been gathered before it was ripe, or afterwards exposed to an improper degree of heat. The effects of heat are also observable in the darker colour of the bark, and the appearance of whitish stripes of a sickly hue, on the inside. Some dependence is placed by the South Americans upon the appearance of the epidermis; and the following commercial varieties have had their origin in this source:—1. *Negrilla,* blackish; 2. *crespilla,* crisped; 3. *pardo-obscura,* dark leopard-gray; 4. *pardo-clara,* bright leopard-gray; 5. *lagartijada,* silver or lizard coloured; 6. *blanquissima,* very white; and 7. *cenicienta,* ash-coloured. The first three are most esteemed. It is possible that among those well skilled in the subject, and thoroughly acquainted with the cinchona tree in its natural state, inferences may be drawn from these appearances, as to the elevation upon the mountains, the degree of exposure to the sun, and sometimes, perhaps, as to the species of the plant; but little reliance can be placed upon them by persons who are not already too well informed to need instruction.

The properties of colour, taste, and smell are more important. The colour which, according to Dr. Devoti, is most highly esteemed, is orange; and the gradations of shades from this to white mark a corresponding diminution in value. A dark colour between red and yellow is considered a sign either of inferiority in species, of improper preparation, or of injurious exposure to air and moisture. The taste should be bitter and very slightly acid, but not acrid, nauseous, nor very astringent. The odour is never very strong; but this quality exists in some degree in the better kinds of bark, and affords a favourable sign when it is decided and peculiar, without being disagreeable.

These remarks are of general application; they will be further extended, when the varieties of bark are separately described.

Classification.

To form a correct and lucid system of classification is the most difficult part of the subject of bark, which is throughout full of perplexities. An arrangement founded on the botanical species, though the most scientific and satisfactory when attainable, is in the present instance utterly out of the question. There are few varieties, of the precise origin of which we can be said to have any certain knowledge; by far the greater number being either derived from an unknown source, or but obscurely traceable to their native tree. Pharmaceutists indeed are not wanting, who are disposed to ascribe all the genuine barks, yielding quinia and cinchonia, to the same species of Cinchona. Guibourt has advanced the opinion, that they are all derived from varieties of the *C. lancifolia;* and adduces in support of it the statement of La Condamine, that when at Loxa he was informed, on good authority, that the trees yielding severally the yellow and red barks could not be distinguished by the eye. (*Journ. de Pharm.* xvi. 220.)

The Spanish merchants adopted a system of classification dependent partly on the place of growth or shipment, and partly on some inherent property or the supposed relative value of the bark. So long as the sources of the drug were very confined, and the number of varieties small, this plan answered the purposes of trade; but at present it is altogether inadequate; and though some of the names originally conferred upon this principle are still retained, they have ceased to be expressive of the truth, and are often erroneously, almost always confusedly applied. The *Loxa* barks embrace, among us, not only those which come from that province, but those also from the neighbourhood of *Huanuco;* while others, which have received different names, are brought from the same place. It is said that, by the traders in South America, the young slender gray barks are called by the name of Loxa, from whatever source they may be derived; while those somewhat larger and older receive their appellation from Lima.

Perhaps the best arrangement for pharmaceutical and medicinal purposes is that adopted in the United States Pharmacopœia, founded upon difference of colour. It is true that dependence cannot be placed upon this property alone; as barks of a similar colour have been found to possess very different virtues; and between the various colours considered characteristic, there is an insensible gradation of shade, so that it is not always possible to decide where one ends and the other begins. Still it has been found that the most valuable barks may be arranged, according to their colour, in three divisions, which, though mingling at their extremes, are very distinctly characterized, in certain specimens, by peculiarity not only in colour, but also in other sensible properties, and even in chemical constitution. The three divisions alluded to are the *pale*, the *yellow*, and the *red*. These may be considered as exclusively the officinal barks; while the inferior varieties which approach one or other of these classes in colour, but differ in other properties, may be treated as extra-officinal, and considered under a separate head. As these inferior kinds come chiefly if not exclusively from the northern ports of New Granada and Venezuela, they are known in commerce by the name of Carthagena barks, and by this name will be described in the present work. Specimens of little value may be occasionally imported from the Pacific coast of South America; but the quantity is small, as the profit they would yield would not pay the expense of so long a voyage. In describing, therefore, the different kinds of bark, we shall treat *first* of the officinal varieties under the three heads of *pale*, *yellow*, and *red*, and secondly of the extra-officinal under the title of *Carthagena barks*. The commercial name will at the same time be given in all instances in which a knowledge of it can be useful in this country. It is proper here to state, that the different barks frequently come to us mingled in the same package, and that, in deciding upon the character of a seroon, the druggist is guided rather by the predominance than the exclusive existence of certain distinctive properties.

1. Pale Bark.

The epithet *pale* applied to these barks is derived from the colour of the powder. The French call them *quinquinas gris*, or gray barks, from the colour of the epidermis. They come into the market in cylindrical pieces of variable length, from a few inches to a foot and a half, sometimes singly, sometimes doubly quilled, from two lines to an inch in diameter, and from half a line to two or three lines in thickness. The finest kinds are about the size of a goosequill. Their exterior surface is usually more or less rough, marked with circular and longitudinal fissures, and of a grayish colour, owing to the lichens which cover the epidermis. The shade is different in different samples. Sometimes it is a light gray, approaching to white, sometimes dull and brown, sometimes a grayish-fawn, and frequently diversified by the intermixture of the proper colour of the epidermis with that of the patches of lichens attached to it. The interior surface, in the finer kinds, is smooth and velvety; in the coarser, it is occasionally rough and somewhat ligneous. Its colour is uniformly a brownish-orange, sometimes inclining to red, sometimes to yellow; and in some inferior specimens is of a dusky hue. The product of the *C. lancifolia* of Bogota, probably received the name of orange-coloured bark from the appearance of its inner surface. The fracture is usually clear, with some short filaments on the internal part only. In the coarser barks it is more fibrous. The colour of the powder is a pale fawn, which is of a deeper hue in the inferior kinds. The taste is moderately bitter and somewhat astringent, without being disagreeable or nauseous. Authors speak also of an acidulous and aromatic flavour, which is less evident. The superior kinds have a feeble odour, which is distinct and agreeably aromatic in the powder and decoction. The pale barks are chemically characterized by containing *a much larger proportion of cinchonia than of quinia.* Their appearance indicates that they were derived from the smaller branches. They are collected in the provinces about Loxa, or in the country which surrounds the city of Huanuco to the north-east of Lima, and are probably derived chiefly from the C. Condaminea, C. scrobiculata, and varieties of the C. lancifolia.

In this country, the pale barks are all known in commerce by the general title of *Loxa bark*. The finest specimens are sometimes called *crown bark of Loxa*, a name also applied to them in England and Germany, and evidently derived from the impression, that they have the same origin and character with the bark formerly selected with great care for the use of the king of Spain and the royal family. It is probable, however, that the best of all the different kinds were appropriated to the royal use; and the honour was certainly possessed by the *yellow* as well as by the *pale*. The extension of the term *Loxa bark* to all the different varieties which belong to this class, is peculiar to the United States, and is not authorized by the facts of the case. They are not obtained exclusively from the province of Loxa, nor from the country bordering upon it. The French and Germans distribute them into several distinct divisions, originally named from the place of growth or export, but depending at present upon peculiarity in properties, without any geographical reference.[*]

[*] Since the publication of the first edition of this Dispensatory, we have had an opportunity of examining Von Bergen's splendid work upon bark, entitled *Versuch einer Monographie der China*, published in Hamburg in the year 1826. His descriptions are undoubtedly among the most precise and accurate which have been published, and we have availed ourselves of them in drawing up the following sketch of the varieties which may be arranged under the head of *pale bark*. We have also consulted, in relation to this subject, the works of the French pharmaceutical writers, particularly that of Guibourt, and the elaborate German work of Geiger, entitled *Hanbuch der Pharmacie, &c.* We have thrown our remarks into the form of a note, as the information in relation to these different varieties can be of little practical use to the student, though it may possibly serve to aid the discrimination of the druggist in the purchase of barks, by enabling him to decide on the relative value of the different parcels submitted to his notice.

1. *Loxa bark, Crown bark.—Quinquina de Loxa*, Fr.—*Loxa-China, Kron-China*, Germ.—This is in cylindrical tubes, strongly rolled, from six to fifteen inches long, from two lines to an inch in diameter, and from half a line to two lines thick. The outer surface is more or less rough, seldom much wrinkled longitudinally, but marked with numerous transverse fissures, which usually run round the bark, and divide it into rings, the edges of which are somewhat elevated. In the larger quills, these fissures are fewer, and more apt to be interrupted. The proper colour of the epidermis is dark-gray, sometimes almost black, sometimes ash-coloured, and occasionally inclining to fawn; but frequently diversified by whitish lichens, which are in some instances so numerous as to cover almost the whole exterior of the bark, and give it a light-gray appearance. The inner surface is smooth and uniform, and of the colour of cinnamon, with occasionally a reddish tinge. The fracture in the smaller quills is quite smooth, in the larger somewhat fibrous. The bark is of a rather firm consistence, and when cut transeversely exhibits a resinous character. Its odour is compared by Guibourt to that perceived in damp woods, by Von Bergen to that of tan. Its taste is acidulous, astringent, and bitterish. The powder is of a dull cinnamon colour. This variety of bark appears to contain, on an average of several results stated by Geiger, about 0.48 per cent. of cinchonia, and 0 06 of quinia. In the thicker pieces, which appear to be richest in the organic alkalies, Thiel found 1.0 per cent. of cinchonia, and 0.03 of quinia. The strong reaction of a solution of gelatin indicates the presence of much tannin. Guibourt describes two varieties of Loxa bark, one answering to the above, under the name of *Quinquina gris brun de Loxa*, the other under that of *Quinquina gris de Loxa*. The latter is characterized by its light-gray colour externally, and by its extreme thinness, which is observable even in the pieces taken from the larger branches. It is considered by this author as identical with the *cascarilla delgada* of Spanish commerce; and is very rare. The Loxa bark is thought to be derived chiefly from the *C. Condaminea*, and to have been the variety first imported into Europe. By some writers it is conjecturally ascribed in part to the *C. scrobiculata*.

2. *Lima or Huanuco bark.—Quinquina de Lima*, Fr.—*China Huanuco, Graue China*, Germ.—The Lima or Huanuco bark, was introduced into notice about the year 1779, after the discovery of Cinchona trees in the central regions of Peru. The first name originated from the circumstance that the bark entered into commerce through the city of Lima, the second was derived from the name of the city, (Huanuco or Guanuco,) in the more immediate neighbourhood of which the trees were found. The dimensions of this variety of bark do not materially differ from those of the preceding, although in the largest pieces the diameter is somewhat greater. Many of the smaller quills have a more or less spiral form. At the edge of most of the complete quills, a sharp oblique slit made with a knife is observable. The epidermis is usually adherent. The exterior surface is marked with longitudinal wrinkles, which in the thick pieces are often so

In this country, the pale bark appears to be falling into disuse; and the sales made by the druggists have, we are informed, been much diminished.

deep as to amount to furrows, penetrating quite through the outer coating of the bark. Transverse fissures are also generally observable, but they never run wholly round the quill, often not more than a quarter or half round, and do not exhibit elevated borders. In some pieces the outer layer of the epidermis is rubbed off either wholly or in spots, and in a few the entire thickness of the external layers, which we usually denominate the epidermis, is here and there removed, exhibiting the proper bark in patches. The colour externally is very light gray, almost milk-white, with occasionally bluish-gray and darkish spots intermingled. Where the outer crust which imparts this whitish colour is wanting, the surface is grayish-fawn or reddish-gray, and in the thicker pieces of a dark cinnamon colour. The inner surface, though in the smaller quills sometimes tolerably uniform, is generally more or less uneven, fibrous, or splintery, especially in the larger pieces, in which may often be observed adhering yellowish-white splinters of wood. The colour is usually a rusty-brown inclining somewhat to red, with occasionally a purplish tinge. The transverse fracture is smooth in the exterior part, fibrous or splintery in the interior. The longitudinal fracture is usually somewhat uneven, without being splintery, and exhibits here and there minute shining spots. The inner layers of the bark are usually soft and friable. The colour of the powder is a full cinnamon-brown. The odour of the bark is like that of clay, and in this respect different from that of all other varieties. The taste is at first acidulous, astringent, and slightly aromatic, and ultimately bitter and adhesive. The proportion of *cinchonia* contained in Huanuco bark, by an average of several results stated by Geiger, is 1.72 per cent,. of *quinia* 0.29 per cent. Von Santen got from the best specimens, as a maximum, 2.73 per cent. of cinchonia and no quinia. The most productive pieces are those of middling size. Guibourt makes two varieties of this bark, the *quinquina gris fin de Lima*, including the smaller quills, and the *quinquina gros Lima*, or *Lima blanc*, including the larger. The botanical origin of the bark is uncertain; but there is reason to believe that it is derived from the varieties of the *C. lancifolia*, described by Ruiz and Pavon.

3. *Jaen bark.—China Jaen, Blasse Ten-China*, Germ.—This is considered as a distinct variety only by the German writers. It probably derives its name from the province of Jaen de Bracomoros, in the vicinity of Loxa, where large quantities of bark have been collected. The Jaen bark is always in quills, which do not differ much in size from those of the Loxa bark, but are distinguishable by being frequently curved longitudinally, or bent in different directions, and somewhat spiral. The outer coat is often partially or entirely rubbed off, leaving the surface smooth and soft to the touch. When the epidermis is perfect, it exhibits small irregular transverse fissures, with occasionally faint longitudinal fissures and wavy wrinkles, and here and there a few warts, but no deep furrows. The colour varies from light or ash-gray to light yellow, diversified with blackish and brownish spots. When the outer coat is rubbed off, it inclines still more to yellow. Considered in mass, the bark always appears somewhat yellowish or straw-coloured. The exterior layers are soft and rather spongy, and may be readily scraped by the nail. The inner surface is exceedingly diversified, sometimes smooth, sometimes uneven and splintery. It is usually of a dull cinnamon colour. The bark is very brittle, and the fracture is smooth in the smaller quills, more or less uneven and sometimes splintery in the larger, and in neither exhibits a resinous appearance. The odour is somewhat sweetish, and is compared to that of tan. The taste is acidulous, slightly astringent, and bitter without being disagreeable. The colour of the powder is cinnamon-brown. In composition this bark resembles the Loxa and Huanuco, though it is said to contain less of the active principles. It is thought by Von Bergen to be derived from the *C. pubescens;* but nothing certain is known of its origin.

Von Bergen describes another variety of pale bark, under the name of *dark Jaen bark* (*Dunkele Ten-China*), or *Pseudo Loxa*, which bears a considerable resemblance to the genuine Loxa, but may be distinguished by the oblique or bent shape of the quills, and the uneven, fibrous, or even splintery appearance of the inner surface. It seldom comes in large pieces. It contains very little of the active principles of bark. Von Santen discovered neither quinia nor cinchonia in two specimens which he examined. Its general appearance, and strong reaction with a solution of gelatin, appear to associate it with the Loxa bark; and Geiger's conjecture is not improbable, that it is the product of the same tree growing in unfavourable situations, or altered by disease.

4. *Huamilies bark.—China Huamilies*, Germ.—This, like the preceding, is not generally known as a distinct variety, though probably identical with the *quinquina ferrugineux*, or ferruginous bark of the French writers. Its commercial name was undoubt-

As it yields little *quinia*, it is not employed in the manufacture of the sulphate of that alkali, which has almost superseded the bark as a remedy in intermittents; and the red bark is preferred by physicians, when it is necessary to resort to the medicine in substance. There is little doubt, however, that *cinchonia* possesses febrifuge properties little if at all inferior to those of *quinia;* and should the source of the latter begin to fail, the pale bark would come into more extensive use for the preparation of the former.

2. Yellow Bark.

The officinal term yellow bark should be considered as applicable only to the valuable variety of the drug having this colour. This is known in commerce under the name of *Calisaya*, said to be derived from a district of country in Bolivia, near the city of La Paz, where the bark is collected. Among the druggists, the Calisaya bark is arranged in two divisions, the quilled and the flat, which sometimes come mixed together in the same seroon, sometimes separate. The appearance of both indicates that they were taken from larger and older branches than those which yield the pale varieties. They are sometimes called by the French *quinquina jaune royal*, from their resemblance to a variety of bark formerly selected for the Spanish king.

The *quilled Calisaya, Calisaya arrolada* of the Spanish Americans, is in pieces from three or four inches to a foot and a half long, from a quarter of an inch to two or three inches in diameter, and of equally variable thickness. The epidermis is of a brownish colour diversified or concealed by whitish or yellowish lichens, is marked by longitudinal wrinkles and transverse

edly derived from the province of Huamilies, which lies in the interior of Peru, to the northward of Huanuco, and is a part of the country explored by the botanical expedition under Ruiz and Pavon. It came into notice in Germany about the beginning of the present century, when a parcel of it was imported directly from Lima into Hamburg. It is in quills and flat pieces. The quills are from three lines to an inch and a half in diameter, from five to sixteen inches long, and from half a line to three lines thick. The flat pieces, which are usually only fragments of the largest quills, are from one to two inches broad, and six to twelve inches long. In general all the layers of the bark are present, but sometimes the outer coat, and even the whole of that part usually called the epidermis in our descriptions of bark, (including those outer layers which in the tree are destitute of vitality, having been thrown outward by the annually renewed layers beneath them,) are wanting in spots, though very seldom entirely absent. The epidermis is comparatively thin, very brittle, soft, and spongy. The outer surface, in the small and middling quills, is sometimes nearly smooth, but usually marked with wavy longitudinal wrinkles, and beset here and there with warts. These warts are abundant upon the thick pieces, which they sometimes almost entirely cover. Transverse fissures are seldom found, and only in the thick pieces. The colour of the epidermis is usually grayish-fawn, here and there passing into a rusty brown; but in the thicker pieces, in which the warts are abundant, it is between a liver and chestnut colour, often mixed with a tinge of purple. When the epidermis is wanting, the colour is often a full ochre yellow. The inner surface is sometimes uniform and almost smooth, sometimes slightly fibrous, rarely splintery. The colour of the surface is rusty brown, occasionally reddish, and in the fibrous or splintery pieces of an ochre yellow. The fracture in the smaller quills is rather even, in the larger presents short fibres, and is sometimes even splintery. The odour of the bark is feeble but agreeable, the taste somewhat aromatic, bitterish, and slightly astringent. The powder is of a full cinnamon colour. The average product of cinchonia and quinia, as stated by Geiger, is 0.67 per cent. of the former, and 0.25 of the latter, so that the bark, though dissimilar in appearance from the other varieties of pale bark, agrees with them in containing more cinchonia than quinia. Von Santen obtained, as a maximum, 1.2 per cent. of cinchonia, and little or no quinia.—*Note to Second Edition.*

fissures, and is often partially separated, and generally easily separable from the proper bark. In the larger kinds it is thick, rough, deeply indented by the transverse fissures which often surround the quills, and is composed of several layers separated from each other by a reddish-brown membrane like velvet. This epidermis yields a dark red powder, is tasteless, and possesses none of the virtues of the bark. It is desirable, therefore, to get rid of it before the bark is powdered, as the medicine is thus procured of greater strength. The bark itself, without the epidermis, is from one to two lines in thickness, of a fibrous texture, and when broken presents shining points, apparently the termination of small fibres running longitudinally, which, examined by the microscope, are found, when freed from a salmon-coloured powder that surrounds them, to be yellow and transparent. They readily separate when the bark is powdered, in the form of spiculæ, which, like those of the cowhage, insinuate themselves into the skin, and produce a disagreeable itching and irritation. The colour of the bark is yellow with a tinge of orange, the taste less astringent than that of the pale bark, but much more bitter and more nauseous. The external cortical layers are more bitter and astringent, and consequently stronger in medicinal power, than the internal; probably from the longer exposure of the latter to the action of air and moisture. The odour is faint, but when the bark is boiled resembles that of the pale varieties. The small quills closely resemble some of the pale varieties in appearance, but may be distinguished by their very bitter taste.

The *flat Calisaya*, *Calisaya plancha* of the Spaniards, which appears to have been derived from the large branches and trunk, is in pieces of various lengths, either quite flat, or but slightly curved, generally destitute of the epidermis, and therefore presenting the yellowish colour of the bark both within and without. It is usually thicker than the quilled, more fibrous in its texture, less compact, less bitter, and possessed of less medicinal power. Though weaker than the proper bark of the quills, it is usually, in equal weight, more valuable than that variety, because free from the useless epidermis.

The valuable yellow bark is characterized by its strongly bitter taste, with comparatively little astringency; by its fine brownish-yellow somewhat orange colour, which is still brighter in the powder; and by *containing a large proportion of quinia with very little cinchonia.* The salts of quinia and lime are so abundant in its composition, that its infusion instantly precipitates a solution of sulphate of soda. (*Guibourt*).*

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* The Calisaya bark is the third variety of Von Bergen, who describes it under the name of *China Regia* or *König's China.* We give a brief abstract of his description, omitting the form and dimensions, which are given with sufficient minuteness in the text. The epidermis,† which in many of the small quills is partly wanting, in the flat pieces usually altogether absent, is very thick and brittle, constituting from a third to one-half of the bark, and in some of the largest quills, or partially quilled pieces, even two-thirds. In the latter case it may often be seen to consist of six or eight different layers. The quills are generally marked with longitudinal wrinkles and furrows, as well as with transverse fissures, the last of which are never absent. The fissures, which often form complete circles round the quills, have usually an elevated border, and sink so deeply in many of the larger pieces, that they are even observable upon the proper bark. In the smaller pieces they are often faint, but usually crowded. The colour of the epidermis varies from

† By the epidermis is here understood the whole of the external layers which are accumulated upon the outer surface of the bark by the annual renewal of the cortical layers, and the consequent separation of those of former years, which remain, but without life, attached to the external surface. A different meaning is attached to the term by Von Bergen, but as we have taken pains to make the description in every instance correspond with our definition, we do not misrepresent his meaning.

Authors are by no means agreed as to the particular species which yields Calisaya bark. Some, influenced simply by its officinal title of yellow bark, have attributed it to the *C. cordifolia*, because Mutis gave the same name to the product of this species. The British Colleges have fallen into this error, without, however, being aware that the yellow bark which they adopted as officinal was really the Calisaya. That it is an error has been fully demonstrated; as no *Calisaya bark* is brought from those regions where the C. cordifolia most abounds. Many writers ascribe this variety to the *C. lancifolia*, on the authority of Mutis himself, who asserts that it is indisputably derived from that species.* This may possibly be the case; and the supposition of M. Guibourt may be true, that the officinal pale, yellow, and red barks are all derived from varieties of the C. lancifolia; but we have no precise information on the subject; and Ruiz himself acknowledges that he is unacquainted with its source.† A curious mistake on this subject is made by Dr. A. T. Thomson in his Dispensatory. Considering the *C. lancifolia* as undoubtedly the origin of the *pale bark*, and at the same time receiving without hesitation the assertion that the *Calisaya* is the product of this species, he has inferred that the two must be identical; and has therefore given Calisaya as one of the synonymes of pale bark; while he has accurately described the true *Calisaya*, but without naming it, under the head of C. cordifolia or yellow bark.

The genuine Calisaya bark is produced most abundantly in Bolivia, formerly Upper Peru, in the province of La Paz; and before the disturbances in these countries, was shipped as well from the port of Buenos Ayres as from those on the Pacific. It is at present, however, procured exclusively from the latter. A very fine parcel was exhibited to us, imported directly from Coquimbo in Chili. We have been informed by gentlemen who have been long personally engaged in commercial transactions upon the Pacific

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whitish-gray to bluish-gray, but is very much diversified by lichens, so as to present yellowish-white, ash-gray, and blackish spots. When the outer layer of the epidermis is wanting, as is not unfrequently the case to a greater or less extent, the colour is somewhat sooty-brown, or almost liver-brown. The outer surface of the pieces without epidermis, is of a colour between cinnamon-brown and dark rusty-brown. The inner surface, in the pieces of all dimensions, is uniform and almost smooth, but exhibits fine longitudinal fibres closely compressed. Splinters of wood are never found adhering to the inner surface, as in some other varieties. The prevailing colour of this surface is mostly a rather dark or full cinnamon-brown, passing sometimes into a rusty-brown, but seldom of a reddish hue. This bark breaks more easily in the longitudinal direction than any other variety, exhibiting a chestnut-brown colour in the part answering to the epidermis, a more or less dark cinnamon-brown in that answering to the proper bark. The transverse fracture of the epidermis is rather even, that of the inner part sometimes fibrous, sometimes splintery. A resinous layer may be observed beneath the epidermis, which usually remains when the latter is removed, and communicates to the flat pieces the dark colour by which their external surface is distinguished. Small sharp splinters, which in the longitudinal fracture appear like shining points, are apt to insinuate themselves into the skin, when the bark is broken or much handled. The odour is feebly tan-like, the taste slightly acidulous, strongly but not disagreeably bitter, somewhat aromatic, feebly astringent, and rather durable. The powder is of a fine cinnamon hue.

Thiel obtained from the flat Calisaya bark 2.3 per cent. of quinia, and 0.08 of cinchonia; *Michaelis* from the flat 3.7 per cent., and from the quill 2.0 per cent. of quinia, but no cinchonia from either; *Von Santen* from the flat, an average of 2.0 per cent. of quinia, and little or no cinchonia; *Wittstock*, on an average, 3.0 per cent. of sulphate of quinia, and 0.12 of cinchonia.—(*Geiger.*)—*Note to Second Edition.*

* Humboldt's "Characteristics of some species of Cinchona." See *Lambert's Illustration*, 1821, p. 53.

† He says, however, that it may be derived from the C. lanceolata, which is now acknowledged to be the same species with the C. lancifolia. (*Memoir by M. Laubert.*) See *Lambert's Illustration*, p. 70.

coast of South America, that the Calisaya bark of commerce is originally obtained chiefly, if not exclusively, at the port of Arica, whither it is brought from the interior provinces of Bolivia. From that town it is sent to various other ports on the Pacific. It is generally supposed to have been first introduced into commerce towards the end of the last century, and it was probably not known by its present name till that period; but La Condamine states that the Jesuits of La Paz, at a period anterior to the discovery of the febrifuge of Loxa, sent to Rome a very bitter bark by the name of *quinaquina,* which, though supposed by that traveller to have been derived from the Peruvian balsam tree, was very probably, as conjectured by Guibourt, the true cinchona. Besides, Pomet, in his *History of Drugs,* published in 1694, speaks of a bark more bitter than that of Loxa, obtained from the province of Potosi, which borders upon that of La Paz; and Chomel also states, that the cinchona tree inhabited the mountains of Potosi, and produced a bark more esteemed than that which grew in the province of Quito. (*Guibourt, Journ. de Pharm.* xvi. 235.) It is possible that, though known at this early period, it may have gone out of use; and its re-introduction into notice towards the end of the last century, may have been mistaken for an original discovery. Whether it is found in the other localities of bark in Peru and Quito, it is difficult to determine; but we may infer from the existence of a commercial variety known to the Spaniards by the name of *Calisaya de Quito,* that either the identical bark, or a variety closely analogous to it, has been found in that province. The *Calisaya de Santa Fe* mentioned by Laubert, has no other claim to the title given it than its colour; and it is not distinguished in the market, perhaps not distinguishable from the ordinary yellow Carthagena bark.

3. RED BARK.

The name of this variety is very appropriately applied, as the colour is usually distinct both in the bark and the powder. In South America it is called *cascarilla roxa* and *colorada.* Some writers have divided it into several sub-varieties; but there does not seem to be ground for such division in any essential difference of properties. Like the *Calisaya,* it comes in quills and flat pieces, which are probably derived from different parts of the same tree.

Some of the pieces are entirely rolled, some partially so, as if they had been taken from half the circumference of the branch; others are nearly or quite flat. They vary very greatly in size, the quill being sometimes less than half an inch in diameter, sometimes so much as two inches, while the flat pieces are occasionally very large and thick, as if derived from the trunk of a tree. They are covered with a reddish-brown or gray, sometimes whitish epidermis, which is rugged, wrinkled longitudinally, and in the thicker pieces marked with furrows, which in some places penetrate to the surface of the proper bark. In many specimens, numerous small roundish or oblong eminences, called warts, may be observed upon the outer surface. Beneath the epidermis is a layer, dark red, brittle, and compact, which possesses some bitterness and astringency, but much less than the interior parts. These are woody and fibrous, of a more or less lively red colour, which is usually very distinct, but in some specimens passes into the orange and even yellowish-brown, so that it is not always possible to distinguish the variety by this property alone. The taste is bitter and astringent, and the odour similar to that of other good barks. Red bark is chemically distinguished by *containing considerable quantities both of quinia and of cinchonia.**

Till very recently, it has been almost universally admitted, on the authority of Mutis, that the red bark was the product of the *C. oblongifolia* of that author, and the *C. magnifolia* of the Flora Peruviana, which is generally supposed to be the same species with the former. But it is now well understood that the *red bark of Santa Fe*, the real product of the *C. oblongifolia*, has little else in common with the true officinal red bark than its colour, and belongs properly to the Carthagena barks. This might have been conjectured from the fact, that none of the best red bark is brought from the Atlantic ports of New Granada, through which the product of the *C. oblongifolia* must at least in part, be sent out of the country. But Von Bergen is the first author who has satisfactorily shown, that the genuine red bark of commerce is not derived from this species. The proofs advanced by him are the following. A specimen of the bark of the *C. oblongifolia*, given by Humboldt to Schrader, was found to be the *quina nova* of commerce, and to bear no resemblance to the genuine red bark; and Humboldt aknowledged to this gentleman, that he was unacquainted with the tree which yields the latter. Ruiz and Pavon, also, though they frequently mention the red bark, agree in stating that they are ignorant of its source; and in the supplement to the Quinologia, mention that the red bark from the *C. oblongifolia* is wholly different from the commercial variety which bears that name. Besides, in the collection belonging to Ruiz, were specimens of the bark of the *C. oblongifolia*, designated by the name of *quina azahar o roja de Santa Fe*, which were entirely different from the genuine red bark, while they bore an exact resemblance to the *quina nova*. These arguments of Bergen are still further strengthened by the testimony of Guibourt, who states that a specimen of the red bark of Mutis, the product of his *C. oblongifolia*, which had been presented by this botanist to Humboldt, and by him deposited in the botanical cabinet of the *Jardin du Roi*, was found upon examination scarcely to differ from that known in commerce by the name of *quina nova*. This *quina nova* is an inferior kind of Carthagena bark, of a red colour, formerly supposed to be furnished by the *Portlandia grandiflora*, and containing little or no quinia or cinchonia. It appears, therefore, that the valuable red bark is not derived from the *C. oblongifolia*, and that nothing is certainly known as to its source. There is some reason to believe that it may be derived from the same species with the pale barks, but taken from the larger branches or the trunk. This opinion receives some support from a statement made by La Condamine, in his memoir upon the subject of cinchona. We are told by this author that three kinds of bark were known in the neighbourhood of Loxa—the white, the yellow, and the red. The white, so named from the colour of the epidermis, scarcely possessed any medicinal virtue, and was obtained from a tree entirely distinct from that which yielded the two other varieties. The red was superior to the yellow; but he was assured, on the very best authority, that the trees producing them grew together, and were not distinguishable by the eye. Of the three varieties mentioned by La Condamine, the white does not reach us; and that which he calls yellow is probably identical with the pale variety of the Pharmacopœia, as this grows most abundantly about Loxa, and before being powdered is often of a yellowish colour. Should it be admitted that the red bark is furnished by the same tree which yields the pale, we have a ready explanation of the difference in size of the two varieties.

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* The red bark is given as a distinct variety by Von Bergen, and stands first on his list, under the name of *China rubra* or *rothe China*. The following is an abstract of his description.

The quills are from two lines to an inch and a quarter in diameter, from one-third of a line to two lines thick, and from two to twelve inches or more in length. The smaller quills are often spiral. The flat pieces are from one to two inches broad, from three-eighths to a quarter of an inch thick, and of the same length as the quills. In the smaller and middling-sized quills, the external surface exhibits longitudinal wavy wrinkles. In the thicker pieces, these wrinkles, between which are here and there longitudinal furrows, often elevate themselves into roundish or oblong warts, which are of a somewhat friable and granular consistence. The longitudinal furrows sometimes penetrate to the bark. Transverse fissures seldom occur. The colour in the smaller quills varies from a fawn-gray to a dull reddish-brown, in the larger is reddish-brown or chestnut-brown with a tinge of purple. When the wrinkles and warts are rubbed off, the peculiar brownish-red colour of the bark appears. The pieces are often in part or almost wholly covered with a whitish-gray or yellowish-white coat, either belonging to the epidermis or consisting of lichens. In some of the quills the epidermis is wanting in spots, which exhibit a dirty reddish-cinnamon colour. The inner surface is delicately fibrous and almost uniform in the small quills, but becomes more fibrous and uneven in the larger, and in the flat pieces is splintery and very irregular. Its colour varies with the size of the pieces, being a reddish-rusty brown in the least, redder in the larger, and a full brownish-red in the largest. The inner surface is also sometimes yellowish, or brownish, or of a dirty appearance. It becomes darker when scraped with the nail or other hard body. The fracture exhibits the different colours of the epidermis and inner bark, as also of a resinous layer which lies between the two. It is usually even in the smaller quills, fibrous in the larger, and at the same time fibrous and splintery in the largest and flat pieces. The fracture of the epidermis, however, is in all either even, or only here and there somewhat granular. The odour is like that of tan and earthy, the taste strongly but not disagreeably bitter, somewhat aromatic, and not lasting. The powder is of a dull brownish-red colour.

Experiments upon many different specimens of red bark, as stated by Pfaff, give as an average result 1.7 per cent. of pure cinchonia, and 0.44 of sulphate of quinia. The highest product obtained was 3.17 per cent. of cinchonia, and 0.15 of sulphate of quinia. Another specimen yielded 1.21 per cent. of the former, and 1.33 of the latter. Pelletier and Caventou obtained 0.8 per cent. of cinchonia, and 1.7 of quinia. (*Geiger.*) It appears, therefore, that the proportion of the alkalies is exceedingly different in different specimens. The degree of bitterness is, perhaps, the best criterion of their efficacy.

Guibourt divides the red bark into two varieties, which he distinguishes by the name of *quinquina rouge verruqueux*, and *quinquina rouge non verruqueux*, from the presence or absence of the warts upon the outer surface. He admits also as a variety, the *quinquina rouge de Santa Fe* of M. Laubert, which ought, if it is properly named, to be placed among the Carthagena barks, and from its want of bitterness might very properly be associated with the red Carthagena bark.—*Note to Second Edition.*

Carthagena Barks.

Under this head may be classed all the barks brought from the northern Atlantic ports of South America. Like those of Peru and Quito, they may be arranged in several subdivisions characterized chiefly by peculiarities of colour. 1. The most abundant is the *yellow Carthagena bark*, which comes in fragments of various sizes, from one to three or even five lines in thickness, usually covered wholly or in part with a white epidermis. The bark itself is of a yellow colour, spongy under the teeth, and of a bitter nauseous taste. It is probably obtained from the *C. cordifolia*, as Guibourt found that a specimen of the bark of this tree, which came originally from Mutis, resembled it precisely in all its sensible properties.* 2. Another

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* Von Bergen considers the Carthagena barks under the two divisions of 1. *China flava dura*, or *harte gelbe China*, and 2. *China flava fibrosa*, or *holzige gelbe China*. As these, with the varieties before noticed as described by him, complete the nine divisions under which he ranks the barks of commerce, we shall give a brief abstract of his account of them. They are both included under the title of *yellow Carthagena bark*, as given in the text.

1. *China flava dura, or hard yellow bark.*—This is in quills and flat pieces. The quills

variety may be called the *brown Carthagena bark.* This also has a white epidermis, which is smooth and without fissures. The bark is hard, compact, very heavy, rough and thick, of a chocolate colour internally, and of a bitter and astringent taste, more disagreeable than that of the pale barks, to which it is in other respects somewhat analogous. Its source is unknown. 3. A third variety is the *red Carthagena bark*, distinguished from the officinal *red bark* by its whitish smooth epidermis, and by its comparatively feeble taste. It is probably derived from the *C. oblongifolia*, and is not known in this country as a distinct variety. 4. Within a few years a variety

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are from three to eight lines in diameter, from half a line to a line and a half thick, and from five to nine inches, and sometimes, though rarely, even fifteen inches long. The flat pieces are considerably thicker, from half an inch to two inches broad, and from four to eight in length. They are often somewhat twisted, and so curved in the drying that the upper surface is rather concave. The epidermis is in many pieces partially or almost wholly wanting. The outer surface is on the whole rather smooth, though it usually exhibits a few faint longitudinal furrows and transverse fissures, and pieces are occasionally found with hard warts or protuberances. In the flat pieces, the epidermis, when present, has somewhat of the consistence of cork, and consists of several layers. The colour of the epidermis varies from yellowish-white to ash-gray, and is sometimes diversified by bluish-gray or blackish lichens. When it is wanting, the colour is between a dark cinnamon and brownish-yellow. These shades, however, are seldom clear, and the flat pieces have usually a somewhat dusty aspect. The inner surface of the quills is tolerably uniform, that of the flat pieces uneven or faintly furrowed and even splintery, the points of the splinters often projecting. Its colour, which is almost always dull, as if the surface were dusty, varies between a light cinnamon and a dull ochre-yellow, and in some pieces is rusty-brown or fawn-gray, or even whitish-yellow. The bark does not readily break in the longitudinal direction. The transverse fracture presents short splinters, and is sometimes fibrous. When cut transversely, the bark obscurely exhibits a very small darker coloured resinous layer beneath the epidermis. The odour is feeble, the taste slightly astringent and bitter, but not strongly so. The powder is of the colour of cinnamon. Von Bergen attributes this variety to the C. cordifolia.

2. *China flava fibrosa*, or *woody yellow bark.*—The shape and dimensions of this variety do not materially differ from the preceding; but the flatter pieces are almost always a little rolled, or curved laterally. The epidermis is seldom entire, being in general either in part or wholly rubbed off. When present, it resembles in consistence that of the former variety. Its outer surface is nearly smooth, only marked here and there with faint irregular transverse fissures and longitudinal furrows. Its colour varies from a dirty whitish-gray to yellowish, but is sometimes more or less dark. When the outer surface is rubbed off, as is the case here and there in the quills, and almost always in the flat pieces, the colour is a nearly pure ochre-yellow. Where the whole thickness of the epidermis is wanting, as happens here and there in spots, it is dark cinnamon, or dark ochre-yellow, and commonly dull or powdery. The inner surface is usually even, but is sometimes irregular and splintery, and always feels harsh to the fingers, leaving small splinters sticking in the skin when drawn over it. The colour is a nearly pure ochre-yellow, like that of the external surface when the outer layer is rubbed off, though somewhat duller and very powdery. The fracture distinguishes this variety from the preceding and from all others. The longitudinal fracture is strikingly fibrous, and in the flat pieces the fragments still hang together by connecting fibres. The bark, moreover, breaks obliquely, and the fracture even of the epidermis, which in other varieties is almost always smooth, is here uneven or rough-grained. The transverse fracture exhibits very long and thin splinters or fibres, which are very flexible, and may almost be said to be soft. No traces of a resinous appearance are observable in the fracture. The odour is feeble, the taste at first woody and flat, afterwards slightly bitter and astringent, and weaker in this than in any other variety of bark. The colour of the powder is intermediate between that of cinnamon and yellow-ochre. The tree from which this variety is obtained is unknown.

Of these two varieties of Carthagena bark, the first yielded, on an average of two experiments, 0.57 per cent. of pure cinchonia, and 0.33 per cent. of sulphate of quinia; the second yielded, on an average of five trials with different specimens, 0.4 per cent. of pure cinchonia, and 0.36 of sulphate of quinia. The highest product of the fibrous bark was about 0.59 per cent. of cinchonia, and 0.52 of sulphate of quinia. From this statement, it appears, that so far as regards the relative proportion of their two active ingredients, they should rank with the red bark, though greatly inferior to it in strength.

has appeared in our market under the name of *Santa Martha bark*, which ranks itself by its characters among those of Carthagena. It derives its name from the port where it is shipped. It is either in small irregularly oblong fragments, flat or but slightly curved, from one to three lines in thickness, usually destitute of epidermis, and presenting an appearance somewhat as if chipped from the large branches or trunk of the tree; or in short quills, partially covered with a whitish epidermis, and evidently derived from the smaller branches. This bark is compact, of a pale yellowish colour, and a bitter, somewhat nauseous taste. It is usually considered superior to the ordinary Carthagena bark, probably from its greater bitterness. May it not be derived from the *C. macrocarpa*, the *C. ovalifolia* of Mutis, which Humboldt informs us grows in the neighbourhood of Santa Martha?

All the Carthagena barks, as will have been observed, have a white somewhat micaceous epidermis. They are also distinguished by a taste less bitter and more nauseous than that of the officinal varieties; and, though they contain more or less quinia and cinchonia, are by no means abundant in these principles.

FALSE BARKS.

Before dismissing the subject of the varieties of cinchona, it is proper to observe, that numerous barks have at various times been introduced into the market, and sold as closely resembling or identical with the febrifuge of Peru, which experience has proved to differ from it materially, both in chemical composition and medicinal virtues. These barks are generally procured from trees which were formerly ranked among the Cinchonæ, but are now arranged in other genera. They are distinguished from the true Peruvian bark by the absence of quinia and cinchonia. Among them are 1. the *Caribæan bark*, from the Exostemma Caribæa; 2. the *St. Lucia bark*, or *quinquina piton* of the French, derived from the Exostemma floribunda; 3. the *Pitaya bark*, known in France by the name of *quinquina bicolor*, supposed by some to be derived from an Exostemma, by others from the Strychnos pseudo-quina; and 4. the bark called on the continent of Europe *new bark* (quina nova), which, though generally ranked with the false barks and considered as the product of the *Portlandia grandiflora*, is believed by some pharmaceutists to be the same with the red bark of Mutis, and should therefore be considered identical with the red Carthagena bark. Most of these barks are scarcely known in the commerce of this country; not one of them is used in our medical practice; and they are mentioned in this place only that the student, when he meets with their names in other works, may know where to refer them.

Chemical History.

In the analysis of Peruvian bark, the attention of chemists was at first directed exclusively to the action of water and alcohol upon it, and to the determination of the relative proportion of its gummy or extractive and resinous matter. The presence of tannin and of various alkaline or earthy salts in minute quantities was afterwards demonstrated. Fourcroy made an elaborate analysis, which attracted much attention at the time, and proved the existence of other principles in the bark than those previously ascertained; but the results which he obtained were not very definite. Dr. Westring was the first who attempted the discovery of an active principle in the bark on which its febrifuge virtues might depend; but he was unable to carry out his conception to any successful result. Seguin afterwards pursued the same track, and endeavoured, by observing the effects of various re-agents to discover the relative value of different varieties of the drug. The conclusions, however, at which he arrived, have not been supported by subsequent experiment. M. Deschamps, an apothecary of Lyons, obtained from bark a crystallizable salt of lime, the acid of which Vauquelin afterwards separated, and called *kinic acid*. The latter chemist also pushed to a much further extent the researches of Seguin, as to the influence of reagents. He examined seventeen different kinds of bark, which he arranged in three classes, according to their chemical relation with certain reagents—the *first* class including those which afforded precipitates with tannin and not with gelatin; the *second*, those which precipitated gelatin and not tannin; the *third*, those which precipitated at the same time tannin, gelatin, and tartar emetic. He supposed those to be the most efficient which gave precipitates with tannin or the infusion of galls; but his classification has been abandoned with the progress of discovery. Reuss of Moscow succeeded in isolating a peculiar colouring matter from red bark, which he designated by the name of *cinchonic red;* and obtained a bitter substance, which probably consisted in part of the peculiar alkaline principles, subsequently discovered. The first step, however, towards the discovery of cinchonia and quinia appears to have been taken by the late Dr. Duncan of Edinburgh. He believed the precipitate afforded by the infusion of cinchona with that of galls, to be a peculiar vegetable principle, and accordingly denominated it *cinchonine.* Dr. Gomez, a Portuguese physician, convinced that the active principle of bark resided in this cinchonine, but in an impure state, instituted experiments upon some pale bark, which resulted in the separation of a white crystalline substance, considered by him to be the pure *cinchonine* of Dr. Duncan. It was obtained by the action of potassa upon an aqueous infusion of the alcoholic extract of the bark, and was undoubtedly the principle now universally known by the name of *cinchonine* or *cinchonia*. But Dr. Gomez was ignorant of its precise nature, considering it to be analogous to resin. M. Laubert afterwards obtained the same principle by a different process, and described it under the name of *white matter* or *pure white resin*. To Pelletier and Caventou was reserved the honour of crowning all these experiments, and applying the results which they obtained to important practical purposes. They demonstrated the alkaline character of the principle discovered by Gomez and Laubert, and gave it definitively the name of *cinchonine*. They discovered in the yellow or Calisaya bark another alkaline principle, which they denominated *quinine*. Both these bases they proved to exist naturally in the barks, combined with the *kinic acid* in the state of *kinate of cinchonine and of quinine*. It has moreover been established by their labours, that the febrifuge property of bark depends upon the presence of these two principles. It was in the year 1820 that these chemists announced their discovery. Dr. Duncan's suggestion was made so early as 1803. Among English and American chemists, the names of these alkaline bodies have been changed to *cinchonia* and *quinia*, for the sake of uniformity of nomenclature; and by these names we shall always call them.

It has before been stated, on more than one occasion, that the three officinal varieties of bark are distinguished by peculiarities of composition. We give the result of the analysis of each variety as obtained by Pelletier and Caventou. (*Journ. de Pharm.* vii. 70. 89. 92.)

Pale bark of Loxa contains, 1. a fatty matter, discovered by Laubert; 2. a red colouring matter, very slightly soluble, identical with the cinchonic red of Reuss; 3. a yellow colouring matter, observed by Laubert, soluble in water and alcohol, and capable of being precipitated by the subacetate of lead; 4. tannin; 5. gum; 6. starch; 7. lignin; 8. kinate of lime; 9. *kinate of cinchonia, with a very minute proportion of kinate of quinia.*

Yellow Calisaya bark contains the fatty matter, the cinchonic red, the yellow colouring matter, tannin, starch, lignin, kinate of lime, and *acidulous kinate of quinia, with a comparatively small proportion of kinate of cinchonia.*

Red bark contains the fatty matter, a large quantity of the cinchonic red, the yellow colouring matter, tannin, starch, lignin, kinate of lime, and *a large proportion both of acidulous kinate of quinia, and of acidulous kinate of cinchonia.*

Carthagena bark contains the same ingredients with the red bark, but in different proportions. It has less of the alkaline matter, which it also yields with much greater difficulty to water, in consequence of the abundance of insoluble cinchonic red which it contains, and which either involves the salts of quinia and cinchonia so as to prevent the full contact of water, or retains these alkalies in a species of combination. (*Journ. de Pharm.* vii. 105.)

By the experiments of Henry Jun. and Plisson, it may be considered as established, that the alkalies of the different varieties of bark are combined at the same time with kinic acid, and with one or more of the colouring matters, which, in relation to these substances, appear to act the part of acids. This idea was originally suggested by Robiquet. (*Journ. de Pharm.* xiii. 282. 369.) It is stated that the compounds of quinia and cinchonia with the cinchonic red are scarcely soluble in water, while the kinates of these bases are very soluble. (Ibid. xvii. 201.)

From the statements above made it appears, that the three officinal varieties of bark differ little, except in the proportion of their constituents. All contain both quinia and cinchonia; the yellow bark abounding in the first, the pale in the second, and the red in both. Gum is the only constituent found in one and not in the others. It is an ingredient in the pale bark, but is wanting in the red and yellow. The observations which follow on the peculiar and characteristic properties of the proximate principles of bark, are derived chiefly from the Memoir of Pelletier and Caventou, published in the 7th volume of the *Journal de Pharmacie.* It may be proper to mention, that MM. Pelletier and Coriol have discovered a new alkaline principle, called *aricina*, in a bark brought from Arica on the Pacific coast of South America, fraudulently mixed with the Calisaya bark.

The *fatty matter*, which was first obtained pure by M. Laubert, is of a greenish colour as obtained from the pale bark, orange-yellow from the yellow. It is insoluble in water, soluble in boiling alcohol, which precipitates a part of it on cooling, very soluble in sulphuric ether even cold, and capable of forming soaps with the alkalies. The colour is probably owing to extraneous matter connected with it.

The *cinchonic red* of Reuss, the *insoluble red colouring matter* of Pelletier and Caventou, is reddish-brown, insipid, inodorous, largely soluble in alcohol, especially when hot, and almost insoluble in ether or water, though the latter dissolves a little at the boiling temperature. The acids promote its solubility in water. It precipitates tartar emetic, but not gelatin; but if treated with a cold solution of potassa or soda, or by ammonia, lime, or baryta with heat, and precipitated by an acid from the solution thus formed, it acquires the property of forming an insoluble compound with gelatin, and seems to be converted into a species of tannin. It is precipitated by subacetate of lead. It is most abundant in the red bark, and least so in the pale.

The *yellow colouring matter* has little taste, is soluble in water, alcohol, and ether, precipitates neither gelatin nor tartar emetic, and is itself precipitated by subacetate of lead.

The *tannin*, or *soluble red colouring matter* of Pelletier and Caventou, has all the properties which chemists consider distinctive of the proximate vegetable principles associated together under this name. It has a brownish-red colour and austere taste, is soluble in water and alcohol, combines with metallic oxides, and produces precipitates with the salts of iron, which vary in colour according to the variety of bark; being deep green with the pale bark, blackish-brown with the yellow, and reddish-brown with the red.

But the most interesting and important constituents of Peruvian bark are the cinchonia and quinia, and the acid with which they are combined. In relation to these, therefore, we shall be more minute in our details.

Cinchonia when pure is a white crystalline substance, soluble in two thousand five hundred parts of boiling water, almost insoluble in cold water, very soluble in boiling alcohol which deposites a portion in the crystalline state upon cooling, and slightly soluble in ether and the fixed and volatile oils. Its bitter taste, at first not very obvious in consequence of its difficult solubility, is developed after a short time by the solution of a minute portion in the saliva. Its alcoholic, ethereal, and oleaginous solutions are very bitter. Its alkaline character is very decided, as it neutralizes the strongest acids, forming with them saline compounds. Of the salts of cinchonia, the sulphate, nitrate, muriate, phosphate, and acetate are soluble in water. The neutral tartrate, oxalate, and gallate are insoluble in cold water, but may be dissolved in hot water or in alcohol. Several processes have been employed for the preparation of cinchonia. One of the simplest is the following. Powdered pale bark is submitted to the action of sulphuric or muriatic acid very much diluted, and the solution thus obtained is precipitated by an excess of lime. The precipitate is collected on a filter, washed with water, and treated with boiling alcohol. The alcoholic solution is filtered while hot, and deposites the cinchonia when it cools. A further quantity is obtained by evaporation. If not perfectly white, it may be freed from colour by first converting it into a sulphate with dilute sulphuric acid, then treating the solution with animal charcoal, filtering, precipitating by an alkali, and redissolving by alcohol in the manner already mentioned. Cinchonia consists, according to Pelletier and Dumas, of 76.97 parts of carbon, 9.02 of nitrogen, 6.22 of hydrogen, and 7.79 of oxygen; and its equivalent number appears, from the analysis of its sulphate by Pelletier and Caventou, to be 307.196, hydrogen being considered as unity. Liebig states the equivalent at 160.4; but this chemist supposes the sulphate of cinchonia, usually considered neutral, to consist of two equiv. of base and one of acid. Exposed to the air cinchonia does not suffer decomposition, but very slowly absorbs carbonic acid, and acquires the property of effervescing slightly with acids.

Sulphate of cinchonia, the only salt of this base which has been employed to any extent in a separate state, may be prepared by heating the cinchonia with a little water, adding dilute sulphuric acid gradually till the alkali is saturated, then boiling with animal charcoal previously washed with muriatic acid, filtering the solution while hot, and setting it aside to crystallize. By alternate evaporation and crystallization, the whole of the sulphate may be obtained from the solution. It is a white, very bitter salt, crystallizing in flexible, somewhat shining, four-sided, flattened prisms, terminated by an inclined face, and generally collected in fasciculi; soluble in fifty-four parts of water at common temperatures, and in a smaller quantity of boiling water; and passing, by the addition of the necessary quantity of acid, into a bisulphate, which is soluble in less than half its weight of water at 58°. It consists, according to Pelletier and Caventou, of 100 parts of cinchonia, and 13.021 of sulphuric acid. (*Journ. de Pharm.* vii. 57.)

Quinia is whitish, and as usually prepared is rather flocculent in its appearance, not crystalline like cinchonia. It may, however, be crystallized, by cautious management, in pearly silky needles. (*Journ. de Pharm.* xi. 249.) It is fusible like the resins, and becomes brittle on cooling. It is more bitter than cinchonia, is almost insoluble in water, but is very soluble in alcohol, and soluble also in ether, and in the fixed and volatile oils. Its alcoholic solution is intensely bitter. It unites with the acids to form salts, which crystallize with facility. The neutral gallate, tartrate, and oxalate, like the analogous salts of cinchonia, are insoluble, or nearly so, in cold water. It is unalterable in the air, not even absorbing carbonic acid. Its constituents, according to Pelletier and Dumas, are carbon 75.02, oxygen 10.43, hydrogen 6.66, nitrogen 8.45. Its equivalent number, that of hydrogen being unity, would appear, from the analysis of the sulphate by Pelletier and Caventou, to be 366.47. M. Baup calculates it at 360, and his results accord with the experiments of Winkler and Buchner. (See *Journ. de Pharm.* xvi. 707.) According to Liebig the equivalent is 171.6; but in his view, the sulphate of quinia, instead of being neutral in composition, as considered by the other chemists, consists in fact of two equiv. of base and one of acid. Quinia is obtained by treating its sulphate with the solution of an alkali, collecting the precipitate which forms, washing it till the water comes away tasteless, then drying it, dissolving it in alcohol at 97° F., and slowly evaporating the solution.

The only important artificial salt of quinia is the sulphate, the process for procuring which, as well as its properties, will be hereafter described. (See *Quiniæ Sulphas*, among the Preparations.)

Kinic Acid, and the Kinates of Cinchonia and Quinia. It may be desirable to procure the alkaline principles in that state of saline combination in which they exist in the bark, as it is possible that they may exert an influence over the system in this state, somewhat different from that produced by their combinations with the sulphuric or other mineral acid. As it is impossible to procure the kinates immediately from the bark in a pure state, it becomes necessary first to obtain the kinic acid separately, which may thus become of some practical importance. We shall therefore briefly describe the mode of procuring it, and its characteristic properties. By evaporating the infusion of bark to a solid consistence, and treating the extract thus obtained with alcohol, we have in the residue a viscid matter consisting chiefly of mucilage and kinate of lime.* If an aqueous solution of this substance be formed, and allowed to evaporate at a gentle heat, crystals of the kinate are deposited, which may be purified by a second crystallization. The salt thus obtained, being dissolved in water, is decomposed by means of oxalic acid, which precipitates the lime and leaves the kinic acid in solution. This may be procured in the crystalline state by spontaneous evaporation. The crystals are transparent and colourless, sour to the taste, and readily soluble in alcohol and water. The kinates of cinchonia and quinia may be obtained either by a direct combination of their constituents, or by the mutual decomposition of the sulphates of those alkalies and the kinate of lime. The *kinate of cinchonia* has a bitter and astringent taste, is very soluble in water, is soluble also in alcohol, and is crystallized with difficulty. The *kinate of quinia* is also very soluble in water, but less so in rectified alcohol. Its taste is very bitter, resembling exactly that of yellow bark. It crystallizes in crusts of a mammillated form, and opaque or semitransparent. The salt is with difficulty obtained free from colour, and only by employing the ingredients in a state of extreme purity. (*Ann. de Chim. et de Phys. Juillet* 1829.)

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* The kinate of lime is soluble in water but not in alcohol.

Of the relations of bark with the several solvents employed in pharmacy we shall speak hereafter, under the heads of its infusion, decoction, and tincture; where we shall also have an opportunity of mentioning some of the more prominent substances which afford precipitates with its liquid preparations. It is sufficient at present to state, that all the substances which precipitate the infusion of bark do not by any means necessarily affect its virtues, as it contains several inert ingredients which form insoluble compounds with bodies which do not disturb its active principles. As gallic, oxalic, and tartaric acids form compounds nearly insoluble in cold water with quinia and cinchonia, it is desirable that substances containing these acids in a free state or in excess, should not be prescribed in connexion with the infusion, decoction, or tincture of bark; for, though it is not improbable that these insoluble gallates, oxalates, and tartrates might be found efficacious if administered, yet being precipitated from the liquid, they would be apt to be thrown away as dregs, or at any rate would communicate to it, if agitated, an unpleasant turbidness.

It is evident from what has been said, that an infusion of bark, on account of the tannin which it contains, may precipitate gelatin, tartar emetic, and the salts of iron, without having a particle of cinchonia or quinia in its composition; and that consequently any inference as to its value drawn from this chemical property, would be altogether fallacious; but, as the active principles are thrown down by gallic acid, no bark can be considered good which does not afford a precipitate with the infusion of galls.

It is impossible to determine with accuracy the relative proportion of the active ingredients in the different varieties of cinchona, as the quantity is by no means uniform in different specimens of the same variety. Pelletier and Caventou state, in their first memoir, that they had been able to obtain only 2 parts of cinchonia from 1000 of pale bark; while from an equal quantity of the yellow they had succeeded in extracting 9 parts of quinia, and from the red 8 parts of cinchonia and 17 parts of quinia. (*Journ. de Pharm.* vii. 92.) But either they employed inferior specimens of the first two varieties, or did not completely exhaust those upon which they experimented. According to a statement subsequently made by them to the French Institute, they obtained from the best Calisaya bark 2.9 per cent. of sulphate of quinia, from inferior kinds 1.5 per cent.; and the average result was 2.33 per cent. (*North Am. Med. and Surg. Journ.* v. 475.) Accounts generally agree in giving less alkaline matter to the pale barks than to the yellow, and more to the red than to either. Mr. Viltmann of Osnabruck, obtained from the Huanuco bark 3.5 per cent. of cinchonia, from the Calisaya or royal yellow, 5 per cent. of quinia, from the red, 6 per cent. of quinia and cinchonia, and from the Carthagena, 3.3 per cent. of alkaline matter. (*Journ. de Chim. Medicale Nov.* 1830.) We cannot, however, avoid suspecting some inaccuracy in the steps by which he obtained results so far exceeding those of the experienced French chemists before quoted.

The following mode of estimating in a hasty way the value of bark by the quantity of alkaline matter it contains, we copy from a communication of M. Tilloy of Dijon, published in the 13th vol. of the *Journ. de Pharmacie*, p. 530. "Take an ounce of the bark coarsely powdered, introduce it into about 12 ounces of alcohol of 30° B. (sp. gr. 0.8748), expose the mixture for half hour to a temperature of from 105° to 120° F., draw off the alcohol, add a fresh portion, and act as before; unite the liquors, and throw into them a sufficient quantity of acetate or subacetate of lead to precipitate the colouring matter and kinic acid, then allow the insoluble matter to subside, and filter. Add to the filtered liquor a few drops of sulphuric acid to separate the excess of acetate of lead, filter, and distil off the alcohol. There remains an acetate or sulphate of quinia, according to the quantity of sulphuric acid employed, together with a fatty matter which will adhere to the vessel. Decant the liquor, and add ammonia, which will instantaneously precipitate the quinia. Too much ammonia will retain it in solution; but in this case a few drops of sulphuric acid will cause it to precipitate. The quinia washed with warm water, and then treated with sulphuric acid, water, and a little animal charcoal, yields very white sulphate of quinia. I have thus obtained in six hours nine grains of the sulphate from an ounce of bark [576 grains French], which is a large proportion when allowances are made for the loss during the process."

Medical Properties and Uses.

This valuable remedy was unknown to the civilized world till about the middle of the seventeenth century; though the natives of Peru are generally supposed to have been long previously acquainted with its febrifuge powers. Humboldt, however, is of a different opinion. In his memoir on the Cinchona forests he states, that it is entirely unknown as a remedy to the Indians inhabiting the country where it grows; and as these people adhere with pertinacity to the practices of their ancestors, he concludes that it never was employed by them. They have generally the most violent prejudices against it, considering it absolutely poisonous; and in the treatment of fever prefer the milder indigenous remedies. Humboldt is disposed to ascribe the discovery of the febrifuge powers of the bark to the Jesuits, who were sent to Peru as missionaries, and among whom were many familiar with the medical knowledge of the day. As bitters had been chiefly relied on in the treatment of intermittent fevers, and as bitterness was observed to be a predominant property in the bark of certain trees which were felled in clearing the forests, the missionaries were naturally led to give it a trial in the same complaint. They accordingly administered an infusion of the bark in the tertian ague, then a prevalent disorder in Peru, and soon ascertained its extraordinary powers. A tradition to this effect is said by Humboldt to be current at Loxa. Ruiz and Pavon, however, are among the writers who ascribe the discovery to the Indians. The Countess of Chinchon, wife of the Viceroy of Peru, having in her own person experienced the beneficial effects of the bark, is said, on her return to Spain in the year 1640, to have first introduced the remedy into Europe. Hence the name of *pulvis Commitissæ*, by which it was first known. After its introduction, it was distributed and sold by the Jesuits, who are said to have obtained for it the enormous sum of its weight in silver. From this circumstance it was called *Jesuits' powder*, a title which it long retained. It had acquired some reputation in England so early as the year 1658; but from its extravagant price, and from the prejudice excited against it, was at first little used. At this early period, however, its origin and nature do not seem to have been generally known; for we are told that Sir John Talbot, an Englishman, having employed it with great success in France, in the treatment of intermittents, under the name of the English powder, at length, in the year 1679, sold the secret of its origin and preparation to Louis XIV., by whom it was divulged.

When taken into the stomach, bark usually excites in a short time a sense of warmth in the epigastrium, which often diffuses itself over the abdomen and even the breast, and is sometimes attended with considerable gastric and intestinal irritation. Nausea and even vomiting are sometimes produced, especially if the stomach was previously in an inflamed or irritated state. Purging, moreover, is not an unfrequent attendant upon its action. After some time has elapsed, the circulation often experiences its influence, as exhibited in the somewhat increased frequency of pulse; and if the dose be repeated, the whole system becomes more or less affected, and all the functions undergo a moderate degree of excitement. Its action upon the nervous system is sometimes evinced by a sense of tension or fulness or slight pain in the head, singing in the ears, and partial deafness, which are always experienced by some individuals when brought completely under its influence. The effects above mentioned entitle bark to a place among the tonics, and it is usually ranked at the very head of this class of medicines. But besides the mere excitation of the ordinary functions of health, it produces other effects upon the system, which must be considered peculiar, and wholly independent of its mere tonic operation. The power by which, when administered in the intervals between the paroxysms of intermittent disorders, it breaks the chain of morbid association, and interrupts the progress of the disease, is something more than what is usually understood by the tonic property; for no other substance belonging to the class, however powerful or permanent may be the excitement which it produces, exercises a control over intermittents at all comparable to that of the medicine under consideration. As in these complaints it is probable, that in the intervals, a train of morbid actions is going on out of our sight, within the recesses of the nervous system, so it is also probable, that bark produces in the same system an action equally mysterious, which supersedes that of the malady, and thus accomplishes the restoration of the patient. From the possession both of the tonic, and of the *anti-intermittent* property, if we may be allowed so to designate it, bark is capable of being usefully applied in the treatment of a great number of diseases.

It may usually be employed with benefit in all morbid conditions of the system, whatever may be the peculiar modifications, in which a permanent corroborant effect is desirable, provided the stomach be in a proper state for its reception. In low or typhoid forms of disease, in which either no inflammation exists, or that which does exist has been moderated by proper measures, or has passed into the suppurative or the gangrenous stage, this remedy is often of the greatest advantage in supporting the system till the morbid action ceases. Hence its use in the latter stages of typhus gravior; in malignant scarlatina, measles, and small pox; in carbuncle, and gangrenous erysipelas; and in all cases in which the system is exhausted under large purulent discharges, and the tendency of the affection is towards recovery. As a tonic, bark is also advantageously employed in chronic diseases connected with debility; as, for example, in scrofula, dropsy, passive hemorrhages, certain forms of dyspepsia, obstinate cutaneous affections, amenorrhœa, chorea, hysteria; in fact, whenever a corroborant influence is desired, and no contra-indicating symptoms exist. But in all these cases it greatly behooves the physician to examine well the condition of the system, and before resorting to the tonic, to ascertain the real existence of an enfeebled condition of the functions, and the absence of such local irritations or inflammations, especially of the stomach or bowels, as would be likely to be aggravated by its use.

But it is in the cure of intermittent diseases that bark displays its most extraordinary powers. It was originally introduced into notice as a remedy in fever and ague, and the reputation which it acquired at an early period it has ever since retained. Very few cases of this disease will be found to resist the judicious use of bark, or some one of its preparations. This is not the place to speak of the precise circumstances under which it is best administered. It will be sufficient to say, that physicians generally concur in recommending its early employment, in divided doses, to the extent of one or two ounces, during the intermission, and the repetition of this plan till the disease is subdued, or the remedy is found insufficient for its cure. Other intermittent diseases have been found to yield with almost equal certainty to the remedy, particularly those of a neuralgic character. Hemicrania and violent pains in the eye, face, and other parts of the body, occurring periodically, are often almost immediately relieved by the use of bark. Some cases of epilepsy, in which the convulsions recurred at regular intervals, have also been cured by it; and even the hectic intermittent is frequently arrested, though, as the cause still generally continues to operate, the relief is too often only temporary. Diarrhœa and dysentery sometimes put on the intermittent form, especially in miasmatic districts; and under these circumstances may often be cured by bark. Nor is it necessary, that, in the various diseases which have been mentioned, the intermission should always be complete, in order to justify a resort to the remedy. Remittent fevers, in which the remission is very decided, not unfrequently yield to the use of bark, if preceded by proper depleting measures. But, as a general rule, the less of the diseased action there is in the interval, the better is the chance of success; and if it exceed a certain point, the bark has usually been found to aggravate instead of relieving the complaint.

Some observations are requisite as to the choice of the barks and the forms of administration. In the treatment of intermittents, either the red or the yellow bark is decidedly preferable to the pale, and of the first two, the red is usually considered the most powerful. With regard to the red, experience had pronounced in its favour long before analysis had proved its superiority. It not only contains more of the active principles of the bark than the other varieties, but has also the advantage of uniting them both in nearly equal proportion. The pale bark may possibly, in its finest forms, be superior for the purposes of a general tonic, as it is less liable to offend the stomach, and perhaps to irritate the bowels.

Where the object is to make a decided and speedy impression, bark is most effectually administered in substance. We can by no means be absolutely certain that quinia and cinchonia are its only active ingredients; and even supposing them to be so, we are equally uncertain whether they may not be somewhat modified in their properties, even by the therapeutically inert principles with which they are associated. In fact, bark in substance has been repeatedly known to cure intermittents when the sulphate of quinia has failed. It is best administered diffused in water or some aromatic infusion. Experience has proved that its efficacy in the cure of intermittents is often greatly promoted by admixture with other substances. A mixture of powdered bark, Virginia snakeroot, and carbonate of soda, was at one time highly esteemed in this city; and another, consisting of bark, confection of opium, lemon-juice, and port wine, has, in our own experience, and that of some of our friends, proved highly efficacious in some obstinate cases of fever and ague.*

But notwithstanding the superior efficacy of the bark in substance, it is in the great majority of instances sufficient to resort to some one of its preparations; and in many cases we are compelled to this resort by the inability of the stomach to support the powder, or the unwillingness of the patient to encounter its disagreeable taste. The best substitute, in cases of intermittent disease, is decidedly the sulphate of quinia, or sulphate of cinchonia, the former of which is used almost to the exclusion of the latter, though not perhaps upon sufficient grounds. The advantage of these preparations is their great facility of administration, and the possibility, by their employment, of introducing a large quantity of the active matter, with less risk of offending the stomach. The sulphate of quinia is now almost universally employed in the treatment of intermittents, and bark resorted to only after this has failed. (See *Quiniæ Sulphas.*)

Though quinia possesses the anti-intermittent power of bark, it is by no means satisfactorily ascertained that it is capable of exerting all the peculiar influence of that medicine as a tonic; but as bark in powder can seldom be supported by a delicate stomach, for a sufficient period to insure the necessary influence of the medicine in chronic disease, it is customary to resort, in this case, to some one of its preparations in which the quinia is extracted in connexion with the other principles; as the infusion, decoction, tincture, and extract. Each of these will be particularly treated of among the preparations. It is here only necessary to say, that their use is mostly confined to chronic cases; or to those of a malignant character, as typhus gravior, &c., in which the whole virtues of bark are desired, but the stomach is unable to bear the powder. Should bark or its preparations produce purging, as they occasionally do, they should be combined with a small proportion of laudanum.

It is sometimes desirable to introduce bark into the system by other surfaces than that of the stomach; and it has been found to exercise its peculiar influence to whatever part it has been applied. Injected into the rectum, in connexion with opium to prevent purging, it has been employed successfully in the cure of intermittents; and the use of bark jackets, made by quilting the powder between two pieces of flannel or muslin, and worn next the skin, and of bark baths made by infusing the medicine in water, has proved serviceable in cases of children. But the best preparation of bark for external application is decidedly the sulphate of quinia, which, sprinkled upon a blistered surface, denuded of the cuticle, is speedily absorbed, and produces on the system effects not less decided than those which result from its internal administration.

The medium dose of bark, as administered in intermittents, is one drachm, to be repeated more or less frequently according to circumstances. When given as a tonic in chronic complaints, the dose is usually smaller; from ten to thirty grains being sufficient to commence with.

Off. Prep. Decoctum Cinchonæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Extractum Cinchonæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Extractum Cinchonæ Resinosum, *Lond.;* Infusum Cinchonæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Mistura Ferri Aromatica, *Dub.;* Quiniæ Sulphas, *U.S.*, *Dub.;* Quiniæ Sulphas Impurus, *U.S.;* Tinctura Cinchonæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Tinctura Cinchonæ Ammoniata, *Lond.;* Tinctura Cinchonæ Comp., *U.S.*, *Lond.*, *Ed.*, *Dub.;* Vinum Gentianæ Comp., *U.S.*, *Ed.* W.

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* The following are the formulæ for these mixtures. 1. ℞ Cinchon. pulv. ℥ss; Serpentariæ pulv. ʒj; Sodæ Carbonat. ʒss: Misce et in pulveres quatuor divide, una tertiâ vel quartâ quâque horâ sumenda. 2. ℞ Cinchon. Rub. pulv. ℥ss; Confect. Opii ʒj; Suc. Limon. recentis f℥ij; Vin. Oporto f℥iv: Misce. Tertia pars, tertiâ quâque horâ sumenda.

CINNAMOMUM. *U.S.*

Cinnamon.

"Laurus Cinnamomum. Cortex. *The bark. U.S.*"

Off. Syn. CINNAMOMI CORTEX. Laurus Cinnamomum. Liber. *Lond.;* LAURI CINNAMOMI CORTEX.—LAURI CASSIÆ CORTEX.—LAURI CASSIÆ FLORES. *Ed.;* CINNAMOMUM. LAURUS CINNAMOMUM. Cortex.—CASSIA. LAURUS CASSIA. Cortex. *Dub.*

Cinnamon.—Cannelle, *Fr.;* Brauner Canel, Zimmt, *Germ.;* Canella, *Ital.;* Canela, *Span.;* Kurundu, *Cingalese;* Karua puttay, *Tamul.*

Cassia.—Cassia lignea; Casse, *Fr.;* Cassienzimmt, *Germ.;* Cannellina, *Ital.;* Casia *Span.*

LAURUS. See CAMPHORA.

Laurus Cinnamomum. Willd. *Sp. Plant.* ii. 477; Woodv. *Med. Bot.* p. 670. t. 233.—*Persea Cinnamomum.* Sprengel, *Syst. Veg.* ii. 263.—*Cinnamomum Zeylanicum.* Hayne, *Darstel. und Beschreib.* xii. 20. The cinnamon tree grows to the height of twenty or thirty feet, with a trunk from twelve to eighteen inches in diameter, irregular, knotty, and covered with a thick, rough, scabrous bark, which is externally ash-coloured, internally reddish. The branches are numerous, strong, horizontal, and declining. The young shoots are beautifully speckled with dark green and light orange colours. From the root spring numerous suckers which form a bush about the trunk. The leaves are from six to nine inches long, and from two to three broad, entire, oblong, pointed, three-nerved, with the lateral nerves vanishing as they approach the point. They are in opposite pairs, and stand upon short slightly channeled footstalks. When young they are generally of a scarlet or light liver-colour, become olive as they approach maturity, are afterwards of a shining green, and ultimately, before they fall, of an olive-yellow. The flowers are small, white, and arranged in axillary and terminal panicles. The fruit is an oval berry, which adheres like the acorn to the receptacle, is larger than the black currant, and when ripe has a bluish-brown surface thickly scattered with white spots.

The tree emits no smell perceptible at any distance. The bark of the root has the odour of cinnamon with the pungency of camphor, and yields this principle upon distillation. The leaves have a spicy odour when rubbed, and a hot taste. The petiole has the flavour of cinnamon. It is a singular fact, that the odour of the flowers is to people in general disagreeable, being compared by some to the scent exhaled from newly sawn bones. The fruit when opened has a terebinthinate odour, and a taste in some degree like that of juniper berries. It is the prepared bark that constitutes the spice so well known and so highly valued under the name of cinnamon.

This species of laurel is a native of Ceylon, where it has long been cultivated for the sake of its bark. It probably grows also in Malabar, in Sumatra, Java, Borneo, Sooloo, and the neighbouring islands; and in Cochin-china, Tonquin, the Chinese province of Quangsi, the Philippines, the Nicobar

Islands, and other parts of the East.* It has at various periods been introduced into the Isle of France, Bourbon, the Cape de Verds, Brazil, Cayenne, several of the West India Islands, and lately into Egypt; and in some of these places is at this time highly productive. This is particularly the case in Cayenne, where the plant was flourishing so early as the year 1755. It has been doubted whether the tree which grows in Sumatra, Cochin-china, &c., is the real Laurus Cinnamomum, or another species of the same genus. Most authors consider it a distinct species, with the name of Laurus Cassia; but there is reason to believe, both from the reports of travellers, and from the similarity of its product with that of the Ceylon tree, that the two plants are specifically identical and differ only in consequence of the variety of soil and climate to which they are exposed.† The Laurus Cinnamomum is exceedingly influenced, as regards the aromatic character of its bark, by the circumstances of soil, climate, and mode of culture. Thus we are told by Marshall that in Ceylon, beyond the limits of Negombo and Matura, in the western and southern aspect of the island, the bark is never of a good quality, being greatly deficient in the spicy, aromatic flavour of the cinnamon; and that even within these limits it is of unequal value from the various influence of exposure, soil, shade, and other circumstances.

Culture, Collection, Commerce, &c. Our remarks under this head will first be directed to the cinnamon of Ceylon, in relation to which we have more precise information than concerning the aromatic obtained from other sources. The bark was originally collected exclusively from the tree in a wild state; but under the government of the Dutch the practice of cultivating it was introduced, and it has been continued since the British have come into possession of the island. The seeds are planted in a prepared soil at certain distances, and as four or five are placed in a spot, the plants usually grow in clusters like the hazel bush. In favourable situations they attain the height of five or six feet in six or seven years, and a healthy bush will then afford two or three shoots fit for peeling; and every second year afterwards will afford from four to seven shoots in a good soil. The cinnamon harvest commences in May and continues till late in October. The first object is to select shoots proper for decortication, and those are seldom cut which are less than half an inch or more than two or three inches in diameter. The bark is divided by longitudinal incisions, of which two are made opposite to each other in the smaller shoots, several in the larger, and is then removed in strips by means of a suitable instrument. The pieces are next collected in bundles, and allowed to remain in this state for a short time, so as to undergo a degree of fermentation which facilitates the separation of the cuticle. The epidermis and the green matter beneath it are removed by placing the strip of bark upon a convex piece of wood, and scraping its external surface with a curved knife. The bark now dries and contracts, assuming the appearance of a quill. The peeler introduces the smaller tubes into the larger, thus forming a congeries of quills into a cylindrical pipe which is about forty inches long. When sufficiently dry, these cylinders are collected into bundles weighing about thirty pounds, and deposited in the government warehouses. The East India Company, which has till recently enjoyed a monopoly of the commerce in cinnamon, employed inspectors, who opened the bales and carefully examined every quill, dividing them into three sorts, two of which were intended for exportation, and the third, consisting of bark that was too old, or too young, or altered by the weather, or inferior from some other cause, was rejected. The better kinds were put into bundles, and shipped for England in the Company's vessels at the ports of Galle and Columbo. The bark of inferior quality was either employed for preparing oil of cinnamon, or exported to the continent of India, whence much of it was said to reach Europe under the name of cassia.

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* Ainslie's Mat. Indic.—Description of the L. Cinnamomum by Marshall. *Electic Repertory*, vol. viii. p. 66. From this last paper we have derived most of the observations which we have made on the cinnamon and cinnamon tree of Ceylon.

† Since the publication of the first edition of this work, we have seen the following notice in the *Lond. and Ed. Philosoph. Mag. for Dec.* 1832, p. 465. In a letter from John B. Batka, an apothecary of Prague, to Mr. Brown, the writer states that, after careful examination, he has concluded that the *L. Cassia* is identical with the *L. Cinnamomum*, the plant commonly cultivated in collections for the L. Cassia, being the *L. Malabathrum*. The species which yields the Chinese cinnamon is not known.

Immense quantities of cinnamon are exported from China, the finest of which is little inferior to that of Ceylon, though the mass of it is much coarser. It passes in commerce under the name of *cassia.* Travellers inform us that the best cinnamon produced in Cochin-china is quite equal to the best of Ceylon; but is monopolized by the sovereign of the country. The inferiority of that which circulates in commerce is probably attributable to the want of care in selecting and preparing the bark. It is supposed that most of the cinnamon obtained from China is imported into that country from Cochin-china and the islands of the Indian Archipelago; but we have good authority for the belief, that this spice is also cultivated within the limits of the Celestial empire.

Cayenne, and several of the West India Islands, yield to commerce considerable quantities of cinnamon of various qualities. That of Cayenne is of two kinds, one of which closely resembles, though it does not quite equal, the aromatic of Ceylon, the other resembles the Chinese. The former is supposed to be derived from plants propagated from a Ceylonese stock, the latter from those which have sprung from a tree introduced from Sumatra.

By far the greater proportion of cinnamon brought to this country is imported from China. It is entered as *cassia* at the custom houses, while the same article brought from other sources is almost uniformly entered as cinnamon. By an examination of the treasury returns from the year 1820 to 1829, we find that the average annual import of this spice has been, in round numbers, 652,000 pounds from China; 12,000 pounds from England, 9,000 pounds from the British East Indies, 3,000 pounds from the West Indies, and an insignificant quantity from all other places, with the exception of 12,758 pounds brought in one year from the Philippines. There is no doubt that much of the amount brought from China is exported; but we have not been able to ascertain the proportion.

Though cassia and cinnamon were both terms used by the ancients, it is impossible to ascertain with certainty whether the spices which they designated were identical with those known by the same names in modern times. Neither the plants nor their localities, as described by Dioscorides, Pliny, and Theophrastus, correspond precisely with our present knowledge; but in this respect much allowance must be made for the inaccurate geography of the ancients. It is not improbable that the Arabian or other Eastern navigators, at a very early period, conveyed this spice within the limits of Phœnician and Grecian, and subsequently of Roman commerce.

Properties. *Ceylon cinnamon* is in long cylindrical fasciculi, composed of numerous quills, the larger enclosing the smaller. It is of a light brownish-yellow colour, almost as thin as paper, smooth, shining, pliable to a considerable extent, with a splintery fracture when broken. It has a pleasant fragrant odour, and a warm, aromatic, slightly pungent, sweetish, and highly agreeable taste. When distilled it affords but a small quantity of essential oil, which, however, has an exceedingly grateful flavour. It is brought to this country from England; but is very costly, and is not generally kept in the shops. The finer variety of *Cayenne cinnamon* approaches in character to that just described, but is paler and in thicker pieces, being usually collected from older branches. That which is gathered very young, is scarcely distinguishable from the cinnamon of Ceylon. It is not recognised in our markets as a distinct variety.

The *Chinese cinnamon*, called *cassia* in commercial language, is in single tubes of various sizes, from an eighth of an inch to half an inch or even an inch in diameter. Sometimes the bark is rolled very much upon itself, sometimes is not even completely quilled, forming segments more or less extensive of a hollow cylinder. It is of a redder or darker colour than the finest of the East India Company's cinnamon, thicker, rougher, denser, and breaks with a shorter fracture. It has a stronger, more pungent and mucilaginous, but less sweet and grateful taste; and, though of a similar odour, is less agreeably fragrant. It is the kind almost universally kept in our shops, and while it is much cheaper than the former variety, is perhaps not inferior to it for the preparation of the various tinctures, &c., into which cinnamon enters as an ingredient. Of a similar character is the cinnamon imported directly from various parts of the East Indies. But under the name of cassia are also brought to us very inferior kinds of cinnamon, collected from the trunks or large branches of the trees, or injured by want of care in keeping, and perhaps some derived from distinct species of Laurus. It is said, that cinnamon from which the oil has been distilled, is sometimes fraudulently mingled with the genuine. These inferior kinds are detected, independently of their greater thickness, and coarseness of fracture, by their deficiency in the peculiar sensible properties of the spice.

We have treated of cinnamon and cassia under the same head; because, even admitting the latter to be sometimes derived from the Laurus Cassia, we are absolutely certain that much of what is sold by that title is real cinnamon, and we are in possession of no grounds by which we can distinguish them. The only differences observable between the numerous varieties, are such as might readily arise from causes unconnected with difference of species; and even the mucilaginous taste of cassia, is ascribed by Dr. A. T. Thomson to the circumstance, that the larger branches being decorticated, and the cuticle only removed, the cellular integument is left, thick, spongy, and full of a slimy mucus. In fact, the very existence of the *Laurus Cassia* as a distinct species, is denied by some botanists, who consider it at most but a variety of the *L. Cinnamomum.*

From the analysis made by Vauquelin, it appears, that cinnamon contains a peculiar essential oil, tannin, mucilage, a colouring matter, an acid, and lignin. The oil obtained from the Cayenne cinnamon, he found to be more biting than that from the Ceylonese, and at the same time to be somewhat peppery. This aromatic yields its virtues wholly to alcohol, and less readily to water. At the temperature of boiling alcohol very little of the oil rises, and an extract prepared from the tincture retains, therefore, the aromatic properties. For an account of the essential oil see *Oleum Cinnamomi.*

Medical Properties and Uses. Cinnamon is among the most grateful and efficient of the aromatics. It is warm and cordial to the stomach, carminative, astringent, and like most other substances of this class, more powerful as a local than general stimulant. It is seldom, however, prescribed alone, though sometimes capable, when given in powder or infusion, of allaying nausea, checking vomiting, and relieving flatulence. It is chiefly used as an adjuvant to other less pleasant medicines, and enters into a great number of officinal preparations. The dose of the powder is from ten grains to a scruple.

Cassia Buds. Under the title of *Flores Lauri Cassiæ*, the Edinburgh College has adopted the *cassia buds* of commerce. They are the dried hexangular receptacles of the seeds of the *Laurus Cinnamomum*, or some analogous species, and are imported exclusively from China. In shape they resemble nails with round heads. The seeds sometimes fall out by drying, and the receptacle is then cup-shaped. They have a brown colour, with the flavour of cinnamon, and yield an essential oil upon distillation. Though little known in this country, they may be used for the same purposes as the bark.

Off. Prep. Acidum Sulphuricum Aromaticum, *U.S., Ed., Dub.;* Aqua Cinnamomi, *Lond., Ed., Dub.;* Aqua Lauri Cassiæ, *Ed.;* Confectio Aromatica, *U.S., Lond., Dub.;* Decoctum Hæmatoxyli, *Dub.;* Electuarium Aromaticum, *Ed.;* Electuarium Catechu Comp., *Ed., Dub.;* Emplastrum Aromaticum, *Dub.;* Infusum Catechu Comp., *Lond., Ed., Dub.;* Pulvis Aromaticus, *U. S., Ed., Dub.;* Pulvis Cinnamomi Comp., *Lond.;* Pulvis Cretæ Comp., *Lond., Ed., Dub.;* Pulvis Kino Comp., *Lond., Dub.;* Spiritus Ætheris Aromaticus, *Lond.;* Spiritus Ammoniæ Aromaticus, *Lond., Dub.;* Spiritus Cinnamomi, *Dub., Ed.;* Spiritus Lavandulæ Comp., *U.S., Lond., Ed., Dub.;* Syrupus Rhei Aromaticus, *U.S.;* Tinctura Cardamomi Comp., *Lond., Dub.;* Tinctura Catechu, *Lond., Ed., Dub.;* Tinctura Cinnamomi, *U.S. Lond., Ed., Dub.;* Tinctura Cinnamomi, Comp. *U.S., Lond., Ed.;* Vinum Opii, *U.S., Lond., Ed., Dub.* W.

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COCCULUS SUBEROSUS. Fructus. *Dub.*

Cocculus Indicus.

Off. Syn. MENISPERMI COCCULI BACCÆ. *Ed.*

Coque du Levant, *Fr.;* Kokkelskörner, Fischkörner, *Germ.;* Galla di Levante, *Ital.*

Cocculus. See COLOMBA.

Several species of Cocculus, described by Linnæus under the common title of *Menispermum Cocculus*, but referred to the genus in which they now stand by De Candolle, produce fruit differing only in size, and bearing the same commercial name of *Cocculus Indicus.* The *C. suberosus* and *C. Plukenetii* of Malabar, and the *C. lacunosus* of the Moluccas and Celebes, are particularly designated by authors. The Dublin College recognises only the *C. suberosus*, on the authority of Roxburgh, who raised this plant from genuine seeds which he had received from Malabar, and planted in the recent state. It is a climbing shrub, with a suberose or corky bark; thick, shining, smooth, cordiform leaves, somewhat truncate at the base; and many-flowered panicles.

The fruit of these Cocculi, as found in the shops, is roundish, somewhat kidney-shaped, about as large as a pea; having a thin, dry, blackish, wrinkled exterior coat, within which is a ligneous bivalvular shell, enclosing a whitish, oily, very bitter kernel. *Cocculus Indicus* is without smell, but has an intensely and permanently bitter taste. M. Boullay discovered in the seeds a peculiar bitter principle which he denominated *picrotoxin.* This is white, crystallizable in quadrangular prisms, soluble in twenty-five parts of boiling and fifty of cold water, very soluble in alcohol and ether, but insoluble in the oils. It is poisonous, and in the quantity of from five to ten grains, given to strong dogs, produces death preceded by convulsions. To procure it, the watery extract of the seeds is triturated with pure magnesia, and then treated with heated alcohol, which dissolves the picrotoxin and yields it upon evaporation. In this state, however, it is impure. To obtain it colourless it must be again dissolved in alcohol, and treated with animal charcoal. After filtration and due evaporation, it is deposited in the crystalline form. Besides picrotoxin, Cocculus Indicus contains a large proportion of fixed oil and some other substances of less interest. The active principle above described is said to reside exclusively in the kernel, uponw hich part M. Boullay operated. In the shell, MM. Pelletier and Couerbe have recently discovered two distinct principles, one having alkaline properties and named *menispermin,* (menispermia,) the other identical with it in composition, but differing by its want of alkalinity, by its volatility, and in its solubility and crystalline form, and denominated *paramenispermin.* They have also found, in the same part, a new acid, which they call *hypo-picrotoxic.* The picrotoxin of M. Boullay they believe to possess acid properties, and, under this impression, propose for it the name of *picrotoxic acid.* (*Jour. de Pharm.* xx. 122.)

Medical Poperties, &c. Coccculus Indicus acts upon the system in the manner of the acrid narcotic poisons; but is never given internally. In India it is used to stupefy fishes in order that they may be caught; and it has been applied to the same purpose in Europe and this country. It is asserted that the fish thus taken have no poisonous properties. The powdered seeds, mixed with oil, are employed in the East Indies as a local application in obstinate cutaneous affections. An ointment made with the powder has been usedin tinea capitis and to destroy vermin in the hair. Picrotoxin has been successfully substituted by Dr. Jaeger for the drug itself. Rubbed up with lard in the proportion of ten grains to the ounce, it usually effected cures of tinea capitis in less than a month. W.

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COCCUS CACTI. *Ed., Dub.*

Cochineal.

Off. Syn. COCCUS. Coccus cacti, *Lond.*

Cochenille, *Fr., Germ.;* Cocciniglia, *Ital.;* Cochinilla, *Span.*

The Coccus is a genus of hemipterous insects, having the snout or rostrum in the breast, the antennæ filiform, and the posterior part of the abdomen furnished with bristles. The male has two erect wings, the female is wingless. The *C. cacti* is characterized by its depressed, downy, transversely wrinkled body, its purplish abdomen, its short and black legs, and its subulate antennæ, which are about one-third of the length of the body. *Rees's Cyclopædia.*

This insect is found wild in Mexico and the adjoining countries, inhabiting different species of Cactus; and is said to have been discovered also in some of the West India islands, and the southern parts of the United States.

In Mexico, particularly in the provinces of Oaxaca and Guaxaca, it is an important object of culture. The Indians form plantations of a species of Cactus, generally supposed to be the *C. coccinilifer*, but thought by Humboldt to be an undescribed species, upon which the insect feeds and propagates. During the rainy season, a number of the females are preserved under cover upon branches of the plant, and are distributed after the cessation of the rains upon the plants without. They perish very speedily after having deposited their eggs. These, hatched by the heat of the sun, give origin to innumerable minute insects, which spread themselves over the plant. The males, of which, according to Mr. Ellis, the proportion is not greater than one to one hundred or two hundred females, being provided with wings and very active, approach and fecundate the latter. After this period, the females, which before moved about, attach themselves to the leaves, and increase rapidly in size, so that, in the end, their legs, antennæ, and proboscis are scarcely discoverable, and they appear more like excrescences on the plant than distinct animated beings. They are now gathered for use, by detaching them from the plant by means of a blunt knife, a few being left to continue the race. They are destroyed either by dipping them enclosed in a bag into boiling water, or by the heat of a stove. In the former case they are subsequently dried in the sun. The males, which are much smaller than the full grown females, are not collected. It is said that of the wild insect there are six generations every year, furnishing an equal number of crops; but the domestic is collected only three times annually, the propagation being suspended during the rainy season, in consequence of its inability to support the inclemency of the weather.

As kept in the shops, the finer cochineal, *grana fina* of Spanish commerce, is in irregularly circular or oval somewhat angular grains, about one-eighth of an inch in diameter, convex on one side, concave or flat on the other, and marked with several transverse wrinkles. Two varieties of this kind of cochineal are known to the druggists, distinguished by their external appearance. One is of a reddish-gray colour, formed by an intermixture of the dark colour of the insect with the whiteness of a powder by which it is almost covered, and with patches of a rosy tinge irregularly interspersed. From its diversified appearance, it is called by the Spaniards *cochinilla jaspeada.* It is the variety commonly kept in our shops. The other, *cochinilla renegrida*, or *grana nigra*, is dark coloured, almost black, with only a minute quantity of the whitish powder between the wrinkles. The two are distinguished in our markets by the name of *silver grains* and *black grains.* Guibourt supposes the difference to depend upon the effect of culture, or, perhaps, on original varieties in the insect. According to others, it arises from the mode of preparation; the gray cochineal consisting of the insects destroyed by a dry heat; the black, of those destroyed by immersion in hot water, which removes the external whitish powder. There is little or no difference in their quality.

Another and much inferior variety, is the *grana sylvestra* or wild cochineal, consisting partly of very small separate insects, partly of roundish or oval masses, which exhibit, under the microscope, minute and apparently new born insects, enclosed in a white or reddish cotton-like substance. It is scarcely known in our drug market.

Cochineal has a faint heavy odour, and a bitter slightly acidulous taste. Its powder is of a purplish carmine colour, tinging the saliva intensely red. According to Pelletier and Caventou, it consists of a peculiar colouring principle which they call *carmine*, a peculiar animal matter constituting the skeleton of the insect, a fatty matter composed of stearin and elaïn, an odorous fatty acid, and various salts. It was also analyzed by John, who called the colouring principle *cochinilin.* Carmine is of a brilliant purple red colour, unalterable in dry air, fusible at 122° F., very soluble in water, soluble in cold and more so in boiling alcohol, insoluble in ether, and without nitrogen among its constituents. It is obtained by macerating cochineal in ether, and treating the residue with successive portions of boiling alcohol, which on cooling deposite a part of the carmine, and yield the remainder by spontaneous evaporation. It may be freed from a small proportion of fatty matter which adheres to it, by dissolving it in alcohol of 40° Baumé, and then adding an equal quantity of sulphuric ether. Pure carmine is deposited in the course of a few days. The watery infusion of cochineal is of a violet crimson colour, which is brightened by the acids, and deepened by the alkalies. The colouring matter of cochineal is readily precipitated. The salts of zinc, bismuth, and nickel, produce a lilac precipitate, and those of iron a dark purple approaching to black. The salts of tin, especially the nitrate and muriate, precipitate the colouring matter of a brilliant scarlet, and form the basis of those splendid scarlet and crimson dyes, which have rendered cochineal so valuable in the arts. With alumina the colouring matter forms the pigment called *lake.* The finest *lakes* are obtained by mixing the decoction of cochineal with freshly prepared gelatinous alumina. The pigment called *carmine* is the colouring matter of cochineal precipitated from the decoction by acids, the salts of tin, &c., or animal gelatin, and when properly made is of the most intense and brilliant scarlet.

Medical Properties, &c. Cochineal is supposed by some to possess anodyne properties, and has been recommended in hooping cough and neuralgic affections; but it is little used internally. In pharmacy it is employed to colour tinctures and ointments.

The dose of a tincture prepared by macerating one part of cochineal in eight parts of diluted alcohol, is for an adult from twenty to thirty drops twice a day. In neuralgic paroxysms, Sauter gave half a tablespoonful, with the effect of curing the disease. W.

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COCHLEARIA OFFICINALIS. Herba. *Dub.*

Common Scurvy-grass.

Cranson, Herbe aux cuillers, *Fr.;* Löffelkraut, *Germ.;* Coclearia, *Ital., Span.*

Cochlearia. See ARMORACIA.

Cochlearia officinalis. Willd. *Sp. Plant.* iii. 448; Woodv. *Med. Bot.* p. 393. t. 112. The common scurvy-grass is an annual or biennial plant, sending up early in the spring a tuft of radical leaves, which are heart-shaped, roundish, of a deep shining green colour, and supported on long footstalks. The leaves of the stem are alternate, oblong, somewhat sinuate, the lower petiolate, the upper sessile. The stem is erect, branched, angular, six or eight inches high, and bears at the extremity of the branches, numerous white cruciform peduncled flowers, in thick clusters. The fruit is a roundish two-celled pod, containing numerous seeds. The whole plant is smooth and succulent.

It is a native of the northern countries of Europe, where, as well as in the United States, it is occasionally cultivated in gardens. The whole herb is officinal. It has, when fresh, a pungent unpleasant odour if bruised, and a warm, acrid, bitter taste. These properties are lost by drying. They are imparted to water and alcohol by maceration, are retained by the expressed juice, and probably depend on a peculiar volatile oil which is separable in very small quantity by distillation with water.

Medical Properties and Uses. Common scurvy-grass is gently stimulant, aperient, and diuretic. It is highly celebrated as a remedy in sea scurvy; and has been recommended in chronic obstructions of the viscera, and certain forms of chronic rheumatism. The fresh plant may be eaten as a salad, or used in the form of infusion in water or wine, or of the expressed juice. Alcohol and water are impregnated with its virtues by distillation, and the distilled spirit has been found useful in paralysis in the dose of thirty drops several times a day. The expressed juice may be used as a local application in scorbutic affections of the gums. W.

COLCHICI RADIX. *U.S.*

Meadow-saffron Root.

"Colchicum autumnale. Bulbus. *The Bulb.*" *U.S.*

COLCHICI SEMEN. *U.S.*

Meadow-saffron Seed.

"Colchicum autumnale. Semina. *The seeds.*" *U.S.*

Off. Syn. COLCHICI RADIX ET SEMINA. Colchicum autumnale. Radix recens et Semina. *Lond.;* COLCHICI AUTUMNALIS RADIX. *Ed.;* COLCHICUM AUTUMNALE. Bulbus. Semina. *Dub.*

Colchique, *Fr.;* Zeitlose, Herbst-Zeitlose, *Germ.;* Colchico, *Ital., Span.*

Colchicum. *Sex. Syst.* Hexandria Trigynia.—*Nat. Ord.* Melanthaceæ.

Gen. Ch. A *spathe. Corolla* six-parted, with a tube proceeding directly from the root. *Capsules* three, connected, inflated. *Willd.*

Colchicum autumnale. Willd. *Sp. Plant.* ii. 272; Woodv. *Med. Bot.* p. 759. t. 258. The meadow-saffron is a perennial bulbous plant, the leaves of which appear in spring, and the flowers in autumn. Its manner of growth is peculiar, and deserves notice in this place, as connected in some measure with its medicinal efficacy. In the latter part of summer a new bulb begins to form at the lateral inferior portion of the old one, which receives the young offshoot in its bosom, and embraces it half round. The new plant sends out fibres from its base, and is furnished with a radical spathe, which is cylindrical, tubular, cloven at top on one side, and half under ground. In September, from two to six flowers, of a purplish rosy colour, emerge from the spathe, unaccompanied with leaves. The corolla consists of a tube five inches long concealed for two-thirds of its length in the ground, and of a limb divided into six segments. The flowers perish by the end of October, and the rudiments of the fruit remain under ground till the following spring, when they rise upon a stem above the surface in the form of a three-lobed, three-celled capsule. The leaves of the new plant appear at the same time, so that in fact they follow the flower instead of preceding it, as might be inferred from the order of the seasons in which they respectively show themselves. The leaves are radical, spear-shaped, erect, numerous, about five inches long, and one inch broad at the base. In the mean time, the new bulb has been increasing at the expense of the old, which having performed its appointed office perishes, while the former, after attaining its full growth, sends forth new shoots from itself, and in its turn decays. Each parent bulb has two offsets.

The C. autumnale is a native of the temperate parts of Europe, where it grows wild in moist meadows. Various attempts have been made to introduce its culture into this country, but with no very encouraging success; though small quantities of the bulb of apparently good quality have been brought into the market. The officinal portions are the bulb and seed. The root, botanically speaking, consists of the fibres which are attached to the base of the bulb. The Pharmacopœias, in adopting the term *Colchici Radix* as officinal, are justified by common usage; while those of the United States and Dublin take care to secure the reader against the possibility of error by designating the bulb as the part intended. The flowers have been found to possess similar virtues with the bulb and seeds, but have not been adopted in the Pharmacopœias.

1. Colchici Radix.

The medicinal virtue of the bulb depends much upon the season at which it is collected. Early in the spring it is too young to have fully developed its peculiar properties; and late in the fall it has become exhausted by the nourishment which it has afforded to the new bulb. The proper period for its collection is from the early part of June, when it has usually attained perfection, to the middle of August, when the offset appears. It is probably owing, in great measure, to this inequality in the colchicum at different seasons, that entirely opposite reports have been given by different authors of its powers. Krapf ate whole bulbs without experiencing inconvenience; Haller found it entirely void of taste and acrimony; and we are told that in Carniola the peasants use it as food with impunity in the autumn. On the contrary, abundant testimony might be adduced of its highly irritating and poisonous nature, of which in fact there exists at present no doubt. Perhaps soil and climate may have some influence in modifying its character.

The meadow-saffron bulb is often used in the fresh state in the countries where it grows, as it is apt to be injured in drying, unless the process is very carefully conducted. The usual plan is to cut the bulb, as soon after it has been dug up as possible, into thin transverse slices, which are spread out separately upon paper or perforated trays, and dried with a moderate heat. The reason for drying it very speedily after removal from the ground, is that it otherwise begins to vegetate, and a change in its chemical nature takes place; and such is its retentiveness of life, that if not cut in slices, it is liable to undergo a partial vegetation even during the drying process. It sustains much loss of weight by exsiccation. Mr. Bainbridge obtained only two pounds fifteen ounces of dried bulb from eight pounds of the fresh.

Properties. The recent bulb of the C. *Autumnale* resembles that of the tulip in shape and size, and is covered with a brown membranous coat. Internally it is solid, white and fleshy; and when cut transversely, yields, if mature, an acrid milky juice. Professor Coxe lays much stress on a small lateral projection from its base, which serves in his opinion to distinguish it from all other bulbs; but which appears to be merely a connecting process between it and the new plant, and is not always present. When dried and deprived of its external membranous covering, the bulb is of an ash-brown colour, convex on one side, and marked on the other by a deep groove extending from the base to the summit. As found in our shops it is always in the dried state, sometimes in segments made by vertical sections of the bulb, but generally in transverse circular slices, about the eighth or tenth of an inch in thickness, with a notch at one part of their circumference.

The cut surface is white, and of an amylaceous aspect. The odour of the recent bulb is said to be *hircine;* the dried is inodorous. The taste is bitter, hot, and acrid. Its constituents, according to Pelletier and Caventou, are a peculiar vegetable alkali denominated *veratria*,* combined with an excess of gallic acid; a fatty matter composed of elaïn, stearin, and a peculiar volatile acid analogous to the cevadic; a yellow colouring matter; gum; starch; inulin in large quantity; and lignin. The active properties are ascribed to the *veratria*, for an account of which see *Veratrum album.* Wine and vinegar extract all the virtues of the bulb. Dr. A. Thomson informs us that the milky juice of fresh colchicum produces a beautiful cerulean blue colour, if rubbed with the alcoholic solution of guaiac; and that the same effect is obtained by substituting for the juice an acetic solution of the dried bulb. He considers the appearance of this colour, when the slices are rubbed with a little distilled vinegar and tincture of guaiac, as a proof that the drug is good and has been well dried. A very deep or large notch in the circumference of the slices is considered by the same author an unfavorable sign, as it indicates that the bulb had been somewhat exhausted in the nourishment of the offset.

Medical Properties and Uses. Meadow-saffron acts upon the nervous system, allaying pain and producing other sedative effects, even when it exerts no obvious influence over the secretions. Generally speaking, when taken in doses sufficiently large to affect the system, it gives rise to more or less disorder of the stomach or bowels, and sometimes occasions active vomiting and purging, with the most distressing nausea. When not carried off by the bowels, it often produces copious diaphoresis, and occasionally acts as a diuretic and expectorant; and a case is on record of violent salivation supposed to have resulted from its use. (*N. Am. Med. and Surg. Jour.* x. 204.) It appears in fact to have the property of stimulating all the secretions, while it rather diminishes than otherwise the action of the heart. In an overdose it is capable of producing dangerous and even fatal effects. It was well known to the ancients as a poison, and is said to have been employed by them as a remedy in gout and other diseases. Störck revived its use among the moderns. He gave it as a diuretic and expectorant in dropsy and humoral asthma; and on the continent of Europe it acquired considerable reputation in these complaints; but the uncertainty of its operation led to its general abandonment, and it had fallen into almost entire neglect, when Dr. Want of London again brought it into notice, by attempting to prove its identity with the active ingredient of the *eau medicinale d'Husson*, so highly celebrated as a cure for gout. The white hellebore had also been considered by some physicians the chief constituent of this empyrical remedy; and the discovery of *veratria* both in the Colchicum and Veratrum album, is an evidence as well of the sagacity of those who traced the resemblance between the actions of these medicines, as of the existence of this alkaline principle in the *eau medicinale*. The chief employment of the meadow-saffron is at present in the treatment of gout and rheumatism, in which experience has abundantly proved it to be a highly valuable remedy. We have, within our own observation, found it especially useful in these affections, when of a neuralgic character. It sometimes produces relief without obviously affecting the system; but is more efficient when it evinces its influence upon the skin or alimentary canal. Professor Chelius states that it changes the chemical constitution of the urine in arthritic patients, producing an evident increase of the uric acid. (*N. Am. Med. and Surg. Jour.* xi. 234.) Dr. Elliotson successfully treated a case of prurigo with the wine of meadow-saffron given in the dose of half a drachm three times a day, and continued for three weeks. (*Medico-Chirug. Rev. Oct.* 1827.) Mr. Ritton has found the powdered bulb an effectual remedy in numerous cases of leucorrhœa. (*Am. Jour. of the Med. Sci.* xv. 527.) The medicine is generally given in the state of vinous tincture. (See *Vinum Colchici Radicis.*) The dose of the dried bulb is from two to eight grains, which may be repeated every four or six hours till the effects of the medicine are obtained.

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* According to Geiger and Hesse, whose experiments have but recently been made known in this country, the organic alkali of the meadow-saffron is peculiar, and entirely distinct from veratria, with which it has been confounded. It has a very bitter and sharp taste, but is destitute of the extreme acrimony of veratria, and does not, like this principle, excite violent sneezing when applied to the nostrils. It differs also in being more soluble in water, and less poisonous in its influence on the animal system. To a kitten eight weeks old, one-tenth of a grain was given dissolved in a little dilute alcohol. Violent purging and vomiting were produced, with apparently severe pain and convulsions, and the animal died at the end of twelve hours. The stomach and bowels were found violently inflamed, with effusion of blood throughout their whole extent. A kitten somewhat younger was destroyed in ten minutes by only the twentieth of a grain of veratria; and on examination after death, marks of inflammation were found only in the upper part of the œsophagus. We do not know that the conclusions of Geiger and Hesse have yet been confirmed by other experimentalists.—(*See Journ. of Phil. Col. of Pharm.* vi. 320.

Off. Prep. Acetum Colchici, *U.S.*, *Lond.;* Oxymel Colchici, *Dub.;* Syrupus Colchici, *U.S.*, *Ed.;* Vinum Colchici Radicis, *U.S.*, *Lond.*

2. Colchici Semen.

The seeds of the meadow-saffron ripen in summer, and should be collected about the end of July or beginning of August. They never arrive at maturity in plants cultivated in a dry soil, or in confined gardens. (*Williams.*) They are nearly spherical, about the eighth of an inch in diameter, and of a reddish-brown colour externally. Their active properties reside in the testa or husk, and they should not, therefore, be bruised in the preparation of the wine or tincture.* Dr. Williams of Ipswich in England, who first brought them into notice, recommends them in the warmest terms in chronic rheumatism, and considers them superior to the bulb, both in the certainty of their effects and the mildness of their operation. There is no doubt that they possess virtues analogous to those of the bulb, and have this advantage, that they are not liable to become injured by drying—an advantage of peculiar value in a country where the plant is not cultivated, and where the bulb cannot be readily procured in the fresh state. A wine of the seeds is directed in the United States Pharmacopœia. Their dose is about the same with that of the bulb.

Off. Prep. Tinctura Seminum Colchici, *Dub.;* Vinum Colchici Seminis, *U.S.*

W.

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* The following description of the seeds is given by Mr. Gray in the Lond. Med. Repository for April, 1821. "*Seeds*, ovate, globose, about one-eighth of an inch in diameter. *Integuments*, simple, soft, spongy, membranaceous, thin, reddish-brown, closely adherent to the perisperm. *Perisperm* or *albumen*, hard, rather cartilaginous, pellucid, pale, not in the least divided, of the same shape as the seed. *Corculum* or *embryo*, very small, ovate globose, not in the least divided, whitish, placed nearly opposite to the *hylum*, or that part where the seed is affixed to the parent plant, but out of the axis of the seed. Base pointing to the hylum, slender. Apex very obtuse." An acquaintance with the real characters of the seeds is the more necessary, as the seeds of other plants have been sold for them.

COLOCYNTHIS. *U.S.*

Colocynth.

"Cucumis colocynthis. Fructus, cortice abjecto. *The fruit deprived of its rind.*" *U.S.*

Off. Syn. COLOCYNTHIDIS PULPA. Cucumis Colocynthis. Peponum Pulpa. *Lond.;* CUCUMERIS COLOCYNTHIDIS PULPA. *Ed.;* CUCUMIS COLOCYNTHIS. Fructûs pulpa. *Dub.*

Coloquinte, *Fr.;* Coloquinte, Coloquintenapfel, *Germ.;* Coloquintida, *Ital., Span.*

Cucumis. *Sex. Syst.* Monœcia Monadelphia.—*Nat. Ord.* Cucurbitaceæ.

Gen. Ch. Male. *Calyx* five-toothed. *Corolla* five-parted. *Filaments* three. Female. *Calyx* five-toothed. *Corolla* five-parted. *Pistil* three-cleft. *Seeds* of the *gourd* with a sharp edge. *Willd.*

Cucumis Colocynthis. Willd. *Sp. Plant.* iv. 611; Woodv. *Med. Bot.* p. 189. t. 71. The *bitter cucumber* is an annual plant, bearing considerable resemblance in appearance to the common cucumber of our gardens. The stems, which are herbaceous and beset with rough hairs, trail upon the ground, or rise upon neighbouring bodies to which they attach themselves by their numerous tendrils. The leaves are of a triangular shape, many-cleft, variously sinuated, obtuse, hairy, of a fine green colour on the upper surface, rough and pale on the under; and stand alternately upon long petioles. The flowers are yellow, and appear singly at the axils of the leaves. The fruit is a globular berry or pepo, of the size of a small orange, yellow and smooth when ripe; and contains, within a hard coriaceous rind, a white, spongy, medullary matter, enclosing numerous ovate, compressed white seeds.

The plant is a native of Turkey, and abounds in the islands of the Archipelago. It grows also in various parts of Africa and Asia. Burkhardt, in his travels across Nubia, found the country covered with it; Thunberg met with it at the Cape of Good Hope; and Ainslie says that it grows in many parts of Lower India, particularly in sandy situations near the sea.

The fruit is gathered in autumn, when it begins to assume a yellow colour, and having been peeled, is dried quickly, either in a stove or by the sun. Thus prepared it is imported from the Levant.

Properties. As kept in the shops, colocynth is in the shape of whitish balls, about the size of a small orange, very light and spongy, and abounding in seeds which constitute three-fourths of their whole weight. The seeds are destitute of active properties, and are even employed as food in some parts of Northern Africa. When the medicine is prepared for use, they are separated and rejected, the pulpy or medullary matter only being employed. This has a very feeble odour, but a nauseous and intensely bitter taste. Vauquelin obtained the bitter principle in a separate state, and called it *colocynthin.* According to the analysis of Meissner, 100 parts of the dry pulp of colocynth contain 14.4 parts of colocynthin, 10.0 of extractive, 4.2 of fixed oil, 13.2 of a resinous substance insoluble in ether, 9.5 of gum, 3.0 of pectic acid (pectin), 17.6 of gummy extract derived from the lignin by means of potassa, 2.7 of phosphate of lime, 3.0 of phosphate of magnesia, and 19.0 of lignin, besides water. (*Berzelius, Trait. de Chim.*) Colocynthin is obtained by boiling the pulp in water, evaporating the decoction, treating the extract thus procured with alcohol, evaporating the alcoholic solution, and submitting the residue, which consists of the bitter principle and acetate of potassa, to the action of a little cold water, which dissolves the latter, and leaves the greater part of the former untouched. It is of a yellowish-brown colour, somewhat translucent, brittle and friable, inflammable, more soluble in alcohol than in water, but capable of imparting to the latter an intense bitterness. The aqueous solution gives with the infusion of galls an abundant white precipitate. An infusion of colocynth, made with boiling water, has a golden-yellow colour, and gelatinizes upon cooling. Neumann obtained from 768 parts of the pulp, treated first with alcohol and afterwards with water, 168 parts of alcoholic and 216 of aqueous extract.

Medical Properties and Uses. The pulp of colocynth is a powerful drastic, hydragogue cathartic, producing, when given in large doses, violent griping, and sometimes bloody discharges, with dangerous inflammation of the bowels. Even in moderate doses it sometimes acts with much harshness, and is therefore seldom prescribed alone. It was frequently employed by the ancient Greeks and the Arabians, though its drastic nature was not unknown to them. Among the moderns it is occasionally used, especially by the German practitioners, in obstinate cases of dropsy, and various affections depending on disordered action in the brain. In combination with other cathartics it loses much of its violence, but retains its purgative energy; and in this state is very extensively employed. The compound extract of colocynth is a favourite preparation with many practitioners; and combined with calomel, extract of jalap, and gamboge, it forms a highly efficient and safe cathartic, especially applicable in congestion of the portal circle, and torpidity of the liver. (See *Pilulæ Catharticæ Compositæ.*) The dose of colocynth is from five to ten grains. It is best administered in a state of minute division effected by trituration with gum or farinaceous matter.

Thunberg states that the fruit of the C. Colocynthis, at the Cape of Good Hope, is rendered so mild by being properly pickled, that it is eaten both by the natives and colonists; but as it is thus employed before attaining perfect maturity, it is possible that the drastic principle may not have been developed.

Off. Prep. Extractum Colocynthidis, *Lond., Dub.;* Extract. Colocynth. Comp., *U.S., Lond., Dub.;* Pil. Colocynth. Comp., *Ed., Dub.* W.

* * *

COLOMBA. *U.S.*

Columbo.

"Cocculus palmatus. Radix. *The root.*" *U.S.*

Off. Syn. CALUMBA. Cocculus palmatus. Radix. *Lond.;* COLOMBÆ RADIX. *Ed.;* COLOMBA. Radix. *Dub.*

Colombo, *Fr.;* Columbowurzel, *Germ.;* Columba, *Ital.;* Raiz de Columbo, *Span.;* Kalumbo, *Port.;* Calumb, *Mozambique.*

The colombo plant was until a recent period unknown to botanists. In the year 1805, M. Fortin, a French gentleman resident at Madras, took to that city from Mozambique an offset from the root, from which a plant was raised in the garden of Dr. Anderson. From a drawing made of this plant, it was ascertained to belong to the natural order *Menispermeæ;* but as the female flowers were wanting, some difficulty was experienced in determining the genus and species. It has, however, been placed in the genus *Cocculus* of De Candolle, separated by that botanist from the genus *Menispermum*, and including those species which have six stamens, while the Menispermum is limited to those with twelve or more. In the Pharmacopœias of the United States and London, the plant is recognised as the *Cocculus palmatus.*

COCCULUS. *Sex. Syst.* Diœcia Dodecandria.—*Nat. Ord.* Menispermeæ.

Gen. Ch. Sepals and Petals ternate, usually in two, rarely in three rows. MALE. *Stamens* six, distinct, opposite the petals. FEMALE. *Drupes* berried, 1–6, generally oblique, reniform, somewhat compressed, one-seeded. *Cotyledons* distinct. *Loudon's Encyc.*

Cocculus palmatus. De Cand. *Syst. Nat.* i. 515; Berry, *Asiat. Research.* x. 385.—*Menispermum palmatum.* Willd. *Sp. Plant.* iv. 825. This is a climbing plant, with a perennial branching root, and annual stems, which are simple, twining, round, hairy, and of the thickness of a goose-quill. The leaves, which stand on round hairy petioles, are alternate, distant, palmate, with five entire acuminate lobes, and five nerves, each of which runs to one of the lobes. The flowers are small, and in axillary solitary compound racemes shorter than the leaves. The calyx has six leaflets, three of which are exterior, three interior; and the corolla has the same number of petals. There are six stamens, which are rather longer than the corolla. The male plant only has been described.

This species of Cocculus is a native of Mozambique, on the south-eastern coast of Africa, where it grows wild in great abundance in the thick forests which extend from the sea many miles into the interior. The plant is never cultivated. The root is dug up in March, when dry weather prevails. From the base of the root numerous fusiform offsets proceed, less fibrous and woody than the parent stock. These offsets are separated and cut into transverse slices, which are dried in the shade. The old root is rejected.

Columbo is a staple export of the Portuguese from their dominions in the South East of Africa. It is taken to India, and thence distributed to various parts of the world. It was formerly supposed to be a product of Ceylon, and to have derived its name from Colombo, a city of that island, from which it was thought to be exported. It is possible that, when the Portuguese were in possession of Ceylon, Colombo may have been the entrepot for the drug brought from Africa, and thus have given origin to its name; but a more probable derivation appears to be from the word *calumb*, which is said to be the Mozambique name for the root.

Properties. The root, as it reaches us, is in flat circular or oval pieces, from the eighth of an inch to near an inch in thickness, and from one to two inches in diameter. The cortical portion is thick, of a bright yellow slightly greenish colour internally, but covered with a brownish wrinkled cuticle. The interior or medullary portion, which is readily distinguishable from the cortical, is light, spongy, yellowish, usually more or less shrunk, so that the pieces are thinnest in the centre; and is frequently marked with concentric circles and radiating lines. Those pieces are to be preferred which have the brightest colour, are most compact and uniform in their texture, and are most free from the worm-holes by which the root is apt to be penetrated. The odour of colombo is slightly aromatic. The taste is very bitter, that of the cortical much more so than that of the central portion, which is somewhat mucilaginous. The root is brittle, and easily pulverized. The powder has a greenish tinge, which becomes browner with age and deepens when it is moistened. As it attracts moisture from the air, and is apt to undergo decomposition, it should be prepared in small quantities at a time.

M. Planche analyzed columbo in 1811, and found it to contain a peculiar azotized substance in large quantity, a bitter yellow substance not precipitated by metallic salts, and one-third of its weight of starch. He obtained also a small proportion of essential oil, salts of lime and potassa, oxide of iron, and silica. Mr. Wittstock of Berlin has subsequently isolated a peculiar crystallizable principle, in which the bitterness resides, and for which he proposes the name of *colombin.* (*Journ. de Pharm. Fevrier*, 1831.) It appears to be the bitter yellow substance of Planche, deprived of a portion of colouring matter. *Colombin* crystallizes in beautiful transparent quadrilateral prisms, is without smell, and is extremely bitter. It is but very slightly soluble in water, alcohol, or ether, at ordinary temperatures, and yet imparts to these fluids a strongly bitter taste. It is more soluble in boiling alcohol, which deposits it upon cooling. The best solvent is diluted acetic acid. It is taken up by alkaline solutions, from which it is precipitated by acids. It has neither acid nor alkaline properties, and its alcoholic and acetic solutions are not affected by the metallic salts, nor the infusion of galls. The process for obtaining it consists in exhausting columbo by means of alcohol of the sp. gr. 0.835, distilling off three-quarters of the alcohol, allowing the residue to stand for some days till crystals are deposited, and lastly treating these crystals with alcohol and animal charcoal. The mother-waters still contain a considerable quantity of colombin, which may be separated by evaporating with coarsely powdered glass to dryness, exhausting the residue with ether, distilling off the ether, treating the residue with boiling acetic acid, and evaporating the solution so that crystals may form. Colombin is thought to be the active principle of columbo, but is probably somewhat modified in its action on the system by the other substances with which it is associated. The virtues of the root are extracted by boiling water and by alcohol. Precipitates are produced with the infusion and tincture by the infusion of galls, the acetate and subacetate of lead, corrosive chloride of mercury, and lime-water; but the bitter principle is not affected by these reagents.

Adulterations. In France, a spurious columbo has been extensively substituted for the genuine root, which, according to Guibourt, has become rare in the commerce of that country. As it may possibly be introduced into our market, it is desirable that our druggists should be put in possession of the characters by which it may be distinguished. Though similar to columbo in appearance, it is different in properties, and is therefore truly a sophistication. It is said to be taken to France from Barbary; but the plant which yields it is not known. Though in round slices like the genuine root, it has an epidermis of a gray-fawn colour, marked with close and parallel circular striæ; its transverse surfaces are irregularly depressed; the medullary portion is of a yellowish-orange, with a deeper coloured circle; the smell is weak like that of gentian, the taste feebly bitter and rather saccharine; the powder is of a yellow-fawn instead of a greenish colour; but the most striking difference is the total absence of starch, which constitutes one-third of columbo. Iodine therefore is an excellent test. If the true columbo be moistened with hot water, and touched with iodine, it immediately assumes a blackish colour; while the spurious root, treated in the same way, undergoes no change. The latter differs also in communicating a fine yellow colour to ether, in evolving ammonia when treated with caustic potassa, and in reddening in infusion the tincture of litmus.

It is said that the root of white bryony, tinged yellow with the tincture of columbo, has sometimes been fraudulently substituted; but the adulteration is too gross to deceive those acquainted with the characters of either of these drugs.

The American columbo, the root of the *Frasera Walteri*, is said to be sold in some parts of Europe for the genuine. Independently of the sensible differences between the two roots, (see *Frasera*,) M. Stolze of Halle states, that while the tincture of columbo remains unaffected by the protosulphate or permuriate of iron, and gives a dirty gray precipitate with tincture of galls, the tincture of frasera acquires a dark green with the former reagent, and is not affected by the latter. (*Duncan.*)

Medical Properties and Uses. Columbo is among the most useful of the mild tonics. Without astringency, with very little stimulating power, and generally acceptable to the stomach, it answers admirably as a remedy in simple dyspepsia, and in those states of debility which are apt to attend convalescence from acute disorders, especially when the alimentary canal is left in an enfeebled condition. Hence it is often prescribed in the declining stages of remittent fever, dysentery, diarrhœa, cholera morbus, and cholera infantum. The absence of irritating properties renders it also an appropriate tonic in the hectic fever of phthisis, and its kindred affections. It is frequently administered in combination with other tonics, with aromatics, with mild cathartics, and with antacids. The remedy which we have found most effectual in the permanent cure of a disposition to the accumulation of flatus in the bowels, is an infusion made with half an ounce of columbo, half an ounce of ginger, a drachm of senna, and a pint of boiling water, and given in the dose of a wineglassful three times a day. Columbo is much used by the natives of Mozambique, and the neighbouring parts of Africa, in dysentery and other diseases. (*Berry.*) It was first introduced to the notice of the profession in Europe by Francois Redi, in the year 1685.

It is most commonly prescribed in the state of infusion. (See *Infusum Colombæ.*) The dose of the powder is from ten to thirty grains, and may be repeated three or four times a day. It is frequently combined with powdered ginger, carbonate of iron, and rhubarb.

Off. Prep. Infusum Colombæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Mistura Ferri Aromatica, *Dub.;* Tinctura Colombæ, *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

CONIUM. *U.S.*

Hemlock.

"Conium maculatum. Folia. *The leaves.*" *U.S.*

Off. Syn. CONII FOLIA et SEMINA. Conium maculatum. Folia et Semina, *Lond.;* CONII MACULATI FOLIA, *Ed.;* CONIUM MACULATUM. Folia. *Dub.*

Ciguë ordinaire, grande ciguë, *Fr.;* Gefleckter Schierling, *Germ.;* Cicuta, *Ital.*, *Span.*

CONIUM. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferæ.

Gen. Ch. *Partial Involucre* halved, usually three-leaved. *Fruit* nearly globular, five-streaked, notched on both sides. *Willd.*

Conium maculatum. Willd. *Sp. Plant.* i. 1395; Bigelow, *Am. Med. Bot.* i. 113; Woodv. *Med. Bot.* p. 104. t. 42. This is an umbelliferous plant, having a biennial spindle-shaped whitish root, and an herbaceous branching stem, from three to six feet high, round, hollow, smooth, shining, slightly striated, and marked with brownish-purple spots. The lower leaves are tripinnate, more than a foot in length, shining, and attached to the joints of the stem by sheathing petioles; the upper are smaller, bipinnate, and inserted at the divisions of the branches; both have channeled footstalks, and incised leaflets which are deep green on their upper surface and paler beneath. The flowers are very small, white, and disposed in compound terminal umbels. The general involucre consists of from five to seven lanceolate, reflected leaflets, whitish at their edges; the partial involucre, of three or four, oval, pointed, spreading, and on one side only. The petals are cordate, with their points inflected, five in number, and nearly equal. The stamens are spreading, and about as long as the corolla; the styles diverging. The fruit is roundish ovate, striated, and composed of two plano-convex seeds, which have on their outer surface five crenated ribs.

The hemlock is a native of Europe, and has been introduced into the United States, where it is now naturalized. It grows usually in bunches along the road sides or in waste grounds, and is found most abundantly in the neighbourhood of old settlements. Its flowers appear in June and July. The whole plant, especially at this period, exhales a fetid odour, usually compared to that of the urine of cats; and narcotic effects are experienced by those who breathe for a long time air impregnated with the effluvia. The plant varies in narcotic power according to the climate and character of the weather, being most active in hot and dry seasons, and in warm countries. The hemlock of Greece, Italy, and Spain, is said to be much more energetic than that of the North of Europe. As a general rule, those plants are most active which grow in a sunny exposure. The proper season for gathering the leaves is when the plant is in flower; and Dr. Fothergill asserts from experimental knowledge, that they are most active about the time when the flowers begin to fade. The footstalks should be rejected, and the leaflets quickly dried, either in the hot sun, or on tin plates before a fire. They should be kept in boxes or tin cases excluded as much as possible from the air and light, by exposure to which they lose their fine green colour, and become deteriorated in medical virtues. The same end is answered by pulverizing them, and preserving the powder in opaque and well stopped bottles.

The term *cicuta*, which till recently was very often applied to this plant, belongs to a different genus.

Properties. The dried leaves of the hemlock have a strong, heavy, narcotic odour, less disagreeable than that of the recent plant. Their taste is bitterish and nauseous; their colour a fine green, which is retained in the powder. The acrimony of the fresh leaves is dissipated by drying, leaving the narcotic property unimpaired. Water distilled from them has the odour of hemlock and a very nauseous taste, but does not produce narcotic effects upon the system. The decoction has little taste, and the extract resulting from its evaporation is nearly inert. From these facts it is inferrible that the active principle, as it exists in the plant, is not volatile at 212°, and is little soluble in water. Alcohol and ether, however, take up the narcotic properties of the leaves; and the ethereal extract, which is of a rich dark green colour, is stated by Dr. A. T. Thomson to have the smell and taste of the plant in perfection, and in the dose of half a grain to produce headach and vertigo. Dr. Paris has prematurely proposed for this substance the name of *conein*, as it has no claim to be considered the active principle, which is only one of its ingredients. We have no satisfactory analysis of hemlock. Schrader found in the juice of the leaves, resin, extractive, gum, albumen, a green fecula, and various saline substances. Brandes obtained from the plant a very odorous oil, albumen, resin, colouring matter, salts, and a peculiar alkaline principle of a strong narcotic smell, a disagreeable nauseous taste insoluble in water, and in the quantity of half a grain producing vertigo a intense headach. This principle has been variously called *cicutin*, *coniin*, and *conicine;* but the most appropriate name would be *conia*. It is obtained by digesting the bruised leaves and stem, for several days, in alcohol, filtering and evaporating the tincture, treating the alcoholic extract with water, adding magnesia, or hydrate of alumina, evaporating the whole to dryness, and submitting the residue to the action of a mixture of ether and alcohol. The solution thus obtained, when filtered and evaporated, yields the principle in question, in the form of a light brownish-yellow substance having the appearance of an extract. It is hardly probable that the *conia* thus obtained is perfectly pure. From recent experiments of Geiger it appears, that the alkaline principle of hemlock is volatile in the uncombined state. He procures it by distilling fresh hemlock with caustic potassa and water, neutralizing the product with sulphuric acid, evaporating to the consistence of syrup, adding anhydrous alcohol so long as a precipitate of sulphate of ammonia is afforded, separating this salt from the liquor, distilling off the alcohol, mixing the residue with a strong solution of caustic potassa, and distilling anew. The *conia* passes over with the water, from which it separates in the form of a yellowish oil, of a strong odour resembling at the same time that of hemlock and tobacco, and an extremely acrid and bitter taste. It is soluble in water, and has a strong alkaline reaction, combining with and neutralizing the acids, and even fuming in some measure like ammonia, on the approach of the volatile acids. It is very poisonous, as are also its salts, though in a much less degree. (*Berzelius*, *Trait. de Chim.*) Some experiments recently made by M. Deschamps have led him to the conclusion, that the volatile substance obtained by Geiger owed its alkalinity to the presence of ammonia. These experiments, however, are not considered as entirely satisfactory by MM. Planche and Boutron, to whom the subject wasreferred by the Society of Pharmacy of Paris. (*See Journ. de Pharm.* xxi. 77 and 84.)

Medical Properties and Uses. Hemlock is narcotic, without being decidedly stimulant or sedative. When given so as fully to affect the system, it produces more or less vertigo, dimness of vision, nausea, faintness, and general muscular debility. In larger doses it occasions dilated pupils, difficulty of speech, delirium or stupor, tremors and paralysis, and ultimately convulsions, and even death. Its operation usually commences in less than half an hour, and if moderate seldom continues longer than twenty-four hours. It is supposed to be the narcotic used by the Athenians to destroy the life of condemned individuals, and by which Socrates and Phocion died. It was also used by the ancients as a medicine, but fell into entire neglect; and was not again brought into notice till the time of Störck, by whom it was much employed and extravagantly praised. Since that period it has been submitted to ample trial, and though its original reputation has not been fully sustained, it still retains a place in the catalogue of useful medicines. It was highly recommended by Störck as a remedy in scirrhus and cancerous ulcers; but at present is considered only a useful palliative in this complaint. In chronic enlargements of the liver and other abdominal viscera; in painful scrofulous tumours and ulcers; in various diseases of the skin, as leprosy and elephantiasis; in the complicated derangements of health attendant upon secondary syphilis; in chronic rheumatism and neuralgic affections; in pertussis, asthma, chronic catarrh, and consumption; and in various other disorders connected with nervous derangement, or a general depraved state of the health, it is occasionally employed with the effect of relieving or palliating the symptoms, or favourably modifying the action of remedies with which it is combined. Dr. Gibson, professor of Surgery in the University of Pennsylvania, speaks highly of its efficacy in the cure of goitre. (See *Phil. Journ. of the Med. and Phys. Scien.* i. 67.)

The powdered leaves, and the inspissated juice (the extract of the Pharmacopœias), are the forms in which it is usually administered. Either of these may be given in the dose of three or four grains twice a day, gradually increased till the occurrence of slight vertigo or nausea indicates that it has taken effect. To maintain a given impression, it is necessary to increase the dose even more rapidly than is customary with most other narcotics, as the system becomes very speedily habituated to its influence. In some instances, the quantity administered in one day has been augmented to more than two ounces. The strength of the preparations of hemlock is exceedingly unequal; and caution is therefore necessary, when the medicine is given in very large quantities, to employ the same parcel, or, if a change be made, to commence with the new parcel in smaller doses, so as to obviate any danger which might result from its greater power. Unpleasant consequences have resulted from a neglect of this precaution. A tincture of hemlock is directed by the Edinburgh and Dublin Colleges, and is an efficient preparation. The fresh juice of the plant has been recommended by Hufeland in the dose of from twelve to forty drops. The seeds have also been employed, and Cullen states that an extract prepared from them is stronger than that of the plant. The fresh leaves are sometimes used externally as an anodyne cataplasm.

Though fatal to some animals, hemlock is eaten with impunity by others, as horses, goats, and sheep. The best method of relieving its poisonous effects, is the speedy evacuation of the stomach.

Off. Prep. Cataplasma Conii, *Dub.;* Extractum Conii, *U.S., Lond., Ed., Dub.;* Tinctura Conii, *Dub.;* Unguentum Conii, *Dub.* W.

CONTRAYERVA. *U.S. Secondary.*

Contrayerva.

"Dorstenia contrayerva. Radix. *The root.*" *U.S.*

Off. Syn. CONTRAJERVÆ RADIX. Dorstenia Contrajerva. Radix. *Lond.;* DORSTENIÆ CONTRAJERVÆ RADIX. *Ed.*

Contrayerva, *Fr.;* Giftwurzel, *Germ.;* Contrajerva, *Ital.;* Contrayerba, *Span.*

DORSTENIA. *Sex. Syst.* Tetrandria Monogynia.—*Nat. Ord.* Urticeæ, *Juss.;* Atrocarpeæ, *R. Brown, Lindley.*

Gen. Ch. Receptacle common, one-leafed, fleshy, in which solitary *seeds* are nestled. *Willd.*

The root known by the name of *contrayerva* is believed to be derived from several species of Dorstenia, among which, besides the *D. Contrayerva,* two others are mentioned by Dr. Houston, the *D. Houstonia,* and *D. Drakena* of Willdenow. The first only is recognised in the Pharmacopœias of the United States and Great Britain.

Dorstenia Contrayerva. Willd. *Sp. Plant.* i. 682; Woodv. *Med. Bot.* p. 705. t. 240. This plant has a perennial, fusiform, branching, rough, compact root, which sends up several leaves of an irregular shape, about four inches in length, lobed, serrated, pointed, and placed upon long radical footstalks, which are winged towards the leaves. The scapes or flower-stems are also radical, rise several inches in height, and support irregular quadrangular receptacles, which contain the necessary parts of fructification. The capsule, when ripe, possesses an elastic power, by which the seeds are thrown out with considerable force.

The plant grows in Mexico and the West Indies, in Peru, Brazil, and other parts of South America. The root, which is the officinal portion, is brought chiefly from the West Indies. The term contrayerba in the Spanish language signifies *counterpoison* or *antidote*, and was applied to this root under the impression that it has the property of counteracting all kinds of poison.

Properties. The root as found in our shops is an inch or two long, of varying thickness, very hard, rough, and solid, of a reddish-brown colour externally and pale within; and has numerous long, slender, yellowish fibres attached to its inferior part. The odour is aromatic; the taste warm, slightly bitterish, and pungent. The fibres have less taste and smell than the tuberous portion. The sensible properties are extracted by alcohol and boiling water. The decoction is of a dark, brownish-red colour, and highly mucilaginous. The tincture reddens infusion of litmus, and lets fall a precipitate on the addition of water. The root has not yet been analyzed.

Medical Properties and Uses. Contrayerva is a stimulant tonic and diaphoretic, and has been given in low states of fever, malignant eruptive diseases, some forms of dysentery and diarrhœa, and other diseases requiring gentle stimulation. It is very seldom used in this country. The dose of the powdered root is about half a drachm.

Off. Prep. Pulvis Contrayervæ Compositus, *Lond.* W.

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CONVOLVULUS PANDURATUS. *U.S. Secondary.*

Wild Potato.

" Convolvulus panduratus. Radix. *The root.*" *U.S.*

Convolvulus. See SCAMMONIUM.

Convolvulus panduratus. Willd. *Sp. Plant.* i. 850; Barton, *Med. Bot.* i. 249. The wild potato has a perennial root, and a round, purplish, procumbent or climbing stem, which twines around neighbouring objects, and grows sometimes twelve feet in length. The leaves, which stand alternately on long petioles, are broad, heart-shaped at the base, entire, or lobed on the sides like a guitar or violin, somewhat acuminate, deep green on the upper surface, and paler beneath. The flowers are in fascicles upon long axillary peduncles. The calyx is smooth and awnless; the corolla tubular campanulate, very large, white at the border, but purplish-red at the base.

The plant is indigenous, growing throughout the United States in sandy fields, and along fences, and flowering from June to August. A variety with double flowers is cultivated in the gardens for the sake of ornament. The root is the active part of the plant.

It is very large, two or three feet in length, about three inches thick, branched at the bottom, externally of a brownish-yellow colour, and full of longitudinal fissures, internally whitish and milky, and of a somewhat acrid taste. Pursh says that he has seen a root as thick as a man's thigh.

Medical Properties. The wild potato is feebly cathartic, and has been proposed as a substitute for jalap, but is scarcely used. It is thought also to be somewhat diuretic, and has been employed, with supposed advantage, in strangury and calculous complaints. Forty grains of the dried root are said to purge gently. Perhaps an extract might be found more effectual.

W.

COPAIBA. *U.S*

Copaiba.

" Copaifera officinalis. Succus. *The juice.*" *U.S.*

Off. Syn. COPAIBA. Copaifera officinalis. Resina liquida. *Lond.;* COPAIFERÆ OFFICINALIS RESINA. Resina liquida. *Ed.;* COPAIFERA OFFICINALIS. Resina liquida. *Dub.*

Baume de copahu, *Fr.;* Copaiva-Balsam, *Germ.;* Balsamo di copaiba, *Ital.;* Balsamo de copayva, *Span.*

Copaifera. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Leguminosæ.

Gen. Ch. Calyx none. *Petals* four. *Legume* ovate. *Seed* one, with an ovate arillus. *Willd.*

The first notice to be found of the copaiba plant is that by Marcgrav and Piso, in the year 1648. Jacquin in 1763 described a species of Copaifera, which grew in the island of Martinique, and which he named *C. officinalis*, from the fact that it afforded this resinous juice. As this was believed to be the same plant with that observed by Marcgrav in Brazil, it was adopted without hesitation in the Pharmacopœias; but their identity is now denied; and Desfontaines has proposed for the officinal species the title of *C. Jaquini*, in honour of the botanist who originally described it. From recent observation and discoveries it appears, that numerous species of Copaifera exist in Brazil and other parts of South America, all of which, according to Martius, yield copaiba. Besides the C. officinalis or C. Jacquini, the following are described by Hayne;—the *C. Guianensis*, *C. Langsdorffii*, *C. coriacea*, *C. Beyrichii*, *C. Martii*, *C. bijuga*, *C. nitida*, *C. laxa*, *C. cordifolia*, *C. Jussieui*, *C. Sellowii*, *C. oblongifolia*, and *C. multijuga*. Hayne believes that the *C.* bijuga is the plant seen by Marcgrav and Piso.

Copaifera officinalis. Willd. ii. 630; Woodv. *Med. Bot.* p. 609. t. 216. *C. Jacquini.* Desfont. *Mem. du Mus.* vii. 376; Hayne, *Darstel. und Beschrieb, &c.* x. 14. This is an elegant tree, with a lofty stem, much branched at the top, and crowned by a thick canopy of foliage. The leaves are alternate, large, and pinnate, composed of from two to five pairs of ovate, entire, obtusely acuminate leaflets, two or three inches in length, rather narrower on one side than the other, smooth, pellucidly punctate, somewhat shining, and supported on short footstalks. The flowers are whitish, and disposed in terminal branched spikes. The fruit is an oval, two-valved pod, containing a single seed.

This species of Copaifera is a native of Venezuela, and grows in the province of Carthagena, mingled with the trees which afford the balsam of Tolu. It grows also in some of the West India islands, particularly Trinidad and Martinique, where it is said to be naturalized. Though recognised in the U.S. and British Pharmacopœias as the source of the officinal copaiba, it yields in fact little of that now in use. According to Hayne, the species from which most of the Copaiba of commerce is derived, is the *C. multijuga*, growing in the province of Para. It is probable that the *C. Guianensis*, which inhabits the neighbouring province of Guiana, especially in the vicinity of the Rio Negro, affords also considerable quantities.

The juice is obtained by making deep incisions into the stems of the trees; and the operation is said to be repeated several times in the same season. As it flows from the wound, it is clear, colourless, and very thin, but soon acquires a thicker consistence, and a yellowish tinge. It is most largely collected in the province of Para, in Brazil, and is brought to this country almost exclusively from the port of Para, in small casks or barrels.

Properties. Copaiba is a clear, transparent liquid, usually of the consistence of olive oil, of a pale yellowish colour, a peculiar not unpleasant odour, and a bitterish, hot, nauseous taste. Its specific gravity varies from 0.950 to 1.000. It is insoluble in water; but is entirely soluble in absolute alcohol, ether, and the fixed and volatile oils. With the alkalies it unites to form saponaceous compounds, which are soluble in water. Its essential constituents are volatile oil and resin, with a minute proportion of an acid which appears to be the acetic. (Durand, *Journ. of the Phil. Col. of Pharm.* i. 3.) As it contains no benzoic acid, it cannot with propriety retain its former title of *balsam of copaiva.* The substances which it most closely resembles, both in composition and properties, are the turpentines. The *volatile oil,* which constitutes from a third to one-half or more of the copaiba, may be separated by distillation. As it first comes over it is colourless, but the latter product is of a fine greenish blue. By redistillation it may be rendered wholly colourless. It is lighter than water, has the odour and taste of copaiba, and appears to contain no oxygen, as potassium is preserved in it even better than in ordinary naphtha. This fact was first noticed by Mr. Durand of Philadelphia, and has been fully confirmed in our own experience. The resinous mass which remains is hard, brittle, translucent, of a greenish-brown colour, and nearly destitute of smell and taste. By mixing it with the oil in proper proportion, we may obtain a liquid identical or nearly so with the original juice. When treated with the oil of petroleum, the resin is separated into two portions, one of which is dissolved, and may be obtained separate by evaporation, the other is left behind. The first is yellowish, hard, and brittle, and constitutes by far the largest proportion of the residuum of the distillation. The second is yellowish-brown, soft, and unctuous; and is supposed by Berzelius to result from the resinification of the volatile oil, as it is more abundant in the old than in the recent juice. Recent copaiba examined by Gerber yielded 41 per cent. of volatile oil, 51.38 of the hard and brittle resin, 2.18 of the soft resin, and 5.44 of water; while an older specimen gave 31.07 per cent. of oil, 53.68 of hard resin, 11.15 of soft resin, and 4.10 of water.

Copaiba, upon exposure to the air, assumes a deeper colour and a thicker consistence, and if spread out upon an extended surface, ultimately becomes dry and brittle. This change is owing partly to the volatilization, partly to the oxidation of the essential oil.

When triturated with about a sixteenth of its weight of magnesia, and set aside, it gradually assumes a solid consistence. (See *Pilulæ Copaibæ.*)

It is said to be frequently adulterated; but the remark is applicable rather to the markets of Europe than to those of the United States. The fixed oils are the most frequent addition, especially castor oil, which, in consequence of its solubility in alcohol, cannot, like the others, be detected by the agency of this fluid. Various plans have been proposed for ascertaining the presence of castor oil. The simplest is to boil one drachm of the copaiba in a pint of water, till the liquid is wholly evaporated. If the copaiba contain oil, the residue will be more or less soft according to the quantity present; otherwise it will be hard. Another mode, proposed by M. Planche, consists in shaking together in a bottle one part of aqua ammoniæ of the sp. gr. 0.9212 (22° Baumé) with two and a half of copaiba, at a temperature of from 50° to 60° F. The mixture, at first cloudy, quickly becomes transparent if the copaiba is pure, but remains more or less opaque if it is adulterated with castor oil. Carbonate of magnesia, caustic potassa, and sulphuric acid, have also been proposed as tests; but the two above mentioned are more certain and of easier application. Turpentine, which is said to be sometimes added to copaiba, may be detected by its smell.

Medical Properties and Uses. Copaiba is gently stimulant, diuretic, laxative, and in very large doses often actively purgative. It produces, when swallowed, a sense of heat in the throat and stomach, and extends an irritant action, not only throughout the alimentary canal, but also to the urinary passages, and in fact, in a greater or less degree, to all the mucous membranes, for which it appears to have a strong affinity. The urine acquires a peculiar odour during its use. It sometimes occasions an eruption upon the skin, attended with a disagreeable itching, and tingling sensation. As a remedy it has been found most efficient in the diseases of the mucous membranes, particularly such as are of a chronic character. Thus it is given with occasional advantage in leucorrhœa, gleet, chronic dysentery, painful hemorrhoidal affections, and in chronic catarrh and other forms of bronchial disease. By Dr. La Roche, of Philadelphia, it is highly recommended in catarrh of the bladder, and in chronic irritation of the same organ. (*Am. Jour. of Med. Scien.* xiv. 13.) It is said to be used as a vermifuge in Brazil. The complaint, however, in which it is most employed is gonorrhœa. It is given in all stages of the disorder; but caution is requisite when the inflammatory symptoms are high. Even in health, if taken largely, it sometimes produces very unpleasant irritation of the urinary passages, and, by sympathy, of the testicles. It was formerly highly esteemed as a vulnerary; but is now seldom used externally.

The dose of copaiba is from twenty to thirty drops three times a day, or a smaller quantity repeated more frequently. It may be given dropped on sugar; but in this form is often so exceedingly offensive, as to render some concealment of its nauseous qualities necessary. A less disagreeable form is that of emulsion, prepared by rubbing the copaiba first with mucilage or the yolk of an egg, and sugar, and afterwards with water impregnated with some aromatic essential oil, as that of mint or cinnamon. The volatile oil may be used in the dose of ten or fifteen drops, and probably with the same effects as the copaiba, of which it is the active ingredient. The resin, which has been proposed as a substitute, is nearly inert. The pills made by means of magnesia may sometimes be resorted to with advantage.

Off. Prep. Pipulæ Copaibæ, *U.S.* W.

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COPTIS. *U.S. Secondary.*

Goldthread.

"Coptis trifolia. Radix. *The root.*" *U.S.*

COPTIS. *Sex. Syst.* Polyandria Polygynia.—*Nat. Ord.* Ranunculaceæ.

Gen. Ch. *Calyx* none. *Petals* five or six, caducous. *Nectaries* five or six, cucullate. *Capsules* five to eight, stipitate, stellately diverging, and rostrate, many-seeded. *Nuttall.*

Coptis trifolia. Bigelow, *Am. Med. Bot.* i. 60; Barton, *Med. Bot.* ii. 97. This little evergreen bears considerable resemblance to the strawberry in size and general aspect. It has a perennial creeping root, which, from its slenderness and bright yellow colour, has given rise to the name of *goldthread*, by which the plant is commonly known. The caudex, from which the petioles and flower-stems proceed, is invested with ovate, acuminate, yellowish, imbricated scales. The leaves, which stand on long slender footstalks, are ternate, with firm, rounded or obovate, sessile leaflets, having an acute base, a lobed and acuminately crenate margin, and a smooth veined surface. The scape or flower-stem is slender, round, rather longer than the leaves, and surmounted by one small white flower, with a minute mucronate bracte beneath it. The petals are oblong, concave, and of a white colour; the nectaries inversely conical, hollow, and yellow at the top. The stamens have capillary filaments and globose anthers. The germs are from five to eight, stipitate, oblong, compressed, and surmounted by short recurved styles with acute stigmas. The capsules, which diverge in a star-like form, are pedicelled, compressed, beaked, and contain numerous black seeds attached to the inner side.

The goldthread inhabits the northern regions of this continent and of Asia, and is found in Greenland and Iceland. It delights in the dark shady swamps and cold morasses of northern latitudes and Alpine regions, and abounds in Canada, and in the hilly districts of New-England. Its blossoms appear in May. All parts of the plant possess more or less bitterness; but this property is most intense in the root, which is the only portion directed by the Pharmacopœia.

Dried goldthread, as brought into the market, is in loosely matted masses, consisting of the long, threadlike, orange-yellow roots, frequently interlaced, and mingled with the leaves and stems of the plant. It is without smell, and has a purely bitter taste, unattended with aroma or astringency. It imparts its bitterness and yellow colour to water and alcohol, but most perfectly to the latter, with which it forms a bright yellow tincture. Its virtues appear to depend on a bitter extractive matter, which like that of quassia, is precipitated by nitrate of silver and acetate of lead. (*Bigelow.*) It affords no evidence of containing either resin, gum, or tannin.

Medical Properties and Uses. It is a simple tonic bitter, bearing a close resemblance to quassia in its mode of action, and applicable to all cases in which that medicine is prescribed; though, from its higher price, not likely to come into general use as a substitute. In New-England it is much employed as a local application in aphthous ulcerations of the mouth; but it probably has no other virtues in this complaint than such as are common to all the simple bitters. It may be given internally in substance, infusion, or tincture. The dose of the powder is from ten to thirty grains, of a tincture prepared by macerating an ounce of the root in a pint of diluted alcohol, one fluidrachm. W.

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CORIANDRUM. *U.S.*

Coriander.

"Coriandrum sativum. Semina. *The seeds.*" *U.S.*

Off. Syn. CORIANDRI SEMINA. Coriandrum sativum. Semina. *Lond.;* CORIANDRI SATIVI SEMINA. *Ed.;* CORIANDRUM SATIVUM. Semina. *Dub.*

Coriandre, *Fr;* Koriander, *Germ.;* Coriandro, *Ital.;* Cilantro, *Span.*

Coriandrum. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferæ.

Gen. Ch. *Corolla* radiate. *Petals* inflex-emarginate. *Universal involucre* one-leafed. *Partial involucres* halved. *Fruit* spherical. *Willd.*

Coriandrum sativum. Willd. *Sp. Plant.* i. 1448; Woodv. *Med. Bot.* p. 137. t. 53. This is an annual plant, with an erect, round, smooth, branching stem, which rises about two feet in height, and is furnished with compound leaves, of which the upper are thrice ternate, with linear pointed leaflets, the lower pinnate, with the pinnæ cut into irregular serrated lobes, resembling those of common parsley. The flowers are white or rose-coloured, and disposed in compound terminal umbels. The fruit is globular, and consists of two concave hemispherical seeds.

The *C. sativum* is a native of Italy, but at present grows wild in most parts of Europe, having become naturalized in consequence of its extensive cultivation. The flowers appear in June, and the fruit ripens in August. It is a singular fact, that all parts of the fresh plant are extremely fetid when bruised, while the seeds become fragrant by drying. These are the officinal portion. They are brought to us from Europe.

The fruit of the coriander, as found in the shops, is globular, about the eighth of an inch in diameter, obscurely ribbed, of a grayish or brownish-yellow colour, and separable into the two seeds of which it consists. It has the persistent calyx at its base, and is sometimes surmounted by the adhering style. The smell and taste are gratefully aromatic, and depend on a volatile oil, which may be obtained separate by distillation. They are imparted to alcohol by maceration, and less readily to water.

Medical Properties and Uses. Coriander has, in a moderate degree, the ordinary medical virtues of the aromatics. It is almost exclusively employed in combination with other medicines, either to cover their taste, to render them acceptable to the stomach, or to correct their griping qualities. The dose is from a scruple to a drachm.

Off. Prep. Aqua Calcis Composita, *Dub.;* Confectio Sennæ, *U.S. Lond., Ed.;* Infusum Gentianæ Compositum, *U.S., Ed.;* Infusum Sennæ, *U.S.;* Infusum Sennæ Compositum, *Lond., Dub.;* Infusum Sennæ cum Tamarindis, *Dub., Ed.;* Tinctura Rhei et Sennæ, *U.S.;* Tinctura Sennæ et Jalapæ, *U.S., Ed.* W.

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CORNU CERVI ELAPHI. *Ed.*

Hartshorn. Stag's Horn.

Off. Syn. CORNUA. Cervus Elaphus. Cornua. *Lond.;* CORNUA CERVINA. Ramenta. *Dub.*

Corne de cerf, *Fr.;* Hirschhorn, *Germ.;* Corno di cervo, *Ital.;* Cuerno de ciervo, *Span.*

The stag or hart—*Cervus Elaphus*—the horns of which are directed by the British Colleges, is a native of Europe. Those of our own common deer—*Cervus Virginianus*—though employed in the arts, are not officinal. Hartshorn is usually imported into this country from Germany, in the state of shavings, but is very little employed.

Hartshorn shavings are without smell and taste, pliable, and of an ivory yellow colour. According to M. Merat-Guillot, they contain in 100 parts, 27 of gelatin, 57.5 of phosphate of lime, 1 of carbonate of lime, and 14.5 of water including the loss. Boiling water extracts their gelatin, forming a transparent, colourless jelly, which may be rendered palatable by the addition of sugar, lemon or orange juice, and a little wine. In its preparation, two pints of water are boiled with four ounces of the shavings to a pint, and the residue strained while hot. The clear liquid gelatinizes upon cooling. By destructive distillation, the shavings yield an impure solution of carbonate of ammonia, which formerly received the name of *spirit of hartshorn;* and the same name has been subsequently applied to similar ammoniacal solutions procured from other sources. When burnt, they leave an earthy residue consisting almost exclusively of phosphate of lime.

Medical Properties, &c. The jelly prepared from the shavings of hartshorn has been thought to possess medical virtues; but it is only nutritive and demulcent; and is probably not superior to calfsfoot jelly. The shavings themselves are used in the preparation of the Pulvis Antimonialis.

Off. Prep. Cornu Ustum, *Lond., Dub.;* Pulvis Antimonialis, *Lond., Ed., Dub.* W.

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CORNUS CIRCINATA. *U.S. Secondary.*

Round-leaved Dogwood.

"Cornus Circinata. Cortex. *The bark.*" *U.S.*

Cornus. *Sex. Syst.* Tetrandria Monogynia.—*Nat. Ord.* Caprifoliaceæ.

Gen. Ch. *Involucre* usually four-leaved. *Petals* superior, four. *Drupe* with a two-celled nut. *Willd.*

We have ten indigenous species of Cornus, all of which are supposed to possess similar medical properties; and three—the *C. Florida, C. circinata,* and *C. sericea*—have been introduced into the Pharmacopœia of the United States. The last two are placed in the secondary list, not because they are esteemed less efficient than the first; but because they have hitherto less attracted the attention of the profession.

Cornus circinata. Willd. *Sp. Plant.* i. 663. This is a shrub from six to ten feet high, with warty branches, large, roundish, pointed leaves, waved on their edges and downy beneath, and white flowers disposed in depressed cymes. The fruit is blue. The plant is a native of the United States, extending from Canada to Virginia, and growing on hill-sides and the banks of rivers. It flowers in June and July.

The bark, when dried, is in quills of a whitish or ash colour, and affords a powder resembling that of ipecacuanha. Its taste is bitter, astringent, and aromatic. In chemical composition, so far as this has been ascertained, it is analogous to the Cornus Florida. It possesses also similar medical virtues, and may be employed in the same doses. It is much used as a tonic and astringent by several physicians in Connecticut, and is highly extolled by Dr. Ives of New York, who recommends, as the most eligible preparation, an infusion made by pouring a pint of boiling water on an ounce of the coarsely powdered bark. The dose of this is from one to two fluidounces. W.

CORNUS FLORIDA. *U.S.*

Dogwood.

"Cornus Florida. Cortex. *The bark.*" *U.S.*

Cornus. See CORNUS CIRCINATA.

Cornus Florida. Willd. *Sp. Plant.* i. 661; Bigelow, *Am. Med. Bot.* ii. 73; Barton, *Med. Bot.* i. 44. This is a small indigenous tree, usually about fifteen or twenty feet in height, though sometimes not less than thirty or thirty-five feet. It is of slow growth; and the stem, which generally attains a diameter of four or five inches, is compact, and covered with a brownish bark, the epidermis of which is minutely divided by numerous superficial cracks or fissures. The branches are spreading, and regularly disposed, sometimes opposite, sometimes in fours nearly in the form of crosses. The leaves are opposite, oval, about three inches long, pointed, dark green, and sulcated on the upper surface, glaucous or whitish beneath, and marked with strong parallel veins. Towards the close of summer they are speckled with black spots, and on the approach of cold weather assume a red colour. The proper flowers are small, yellowish, and collected in heads, which are surrounded by a very large conspicuous involucre, consisting of four white obcordate leaves, having the notch at their summit tinged with red or purple. It is this involucre that constitutes the chief beauty of the tree at the period of flowering. The calyx is four-toothed, and the corolla composed of four obtuse reflexed petals. The fruit is an oval drupe of a vivid glossy red colour, containing a two-celled and two-seeded nucleus. The drupes are usually collected to the number of three or four, and remain on the tree till after the early frosts. They ripen in September.

The dogwood is found in all parts of the United States, from Massachusetts to the Mississippi and the Gulf of Mexico; but is most abundant in the Middle States. In the month of May it is clothed with a profusion of large white blossoms, which render it one of the most conspicuous ornaments of the American forests. The bark is the officinal portion, and is derived for use both from the stem and branches, and from the root. The bark of the root is preferred. It is brought into market in pieces, of various sizes, usually more or less rolled, sometimes invested with a fawn-coloured epidermis, sometimes partially or wholly deprived of it, of a reddish-gray colour, very brittle, and affording, when pulverized, a grayish powder tinged with red. The odour of dogwood is feeble, its taste bitter, astringent, and slightly aromatic. Water and alcohol extract its virtues. It has not been accurately analyzed; but from the experiments of Dr. Walker and others, appears to contain extractive matter, gum, resin, tannin, and gallic acid. A peculiar bitter principle, for which the name of *cornine* has been proposed, has been announced as an ingredient by Mr. Carpenter; but we need more definite information on the subject. The flowers of the *C. Florida* have the same bitter taste as the bark, and though not officinal, are sometimes employed for the same purposes.

Medical Properties and Uses. Cornus Florida is tonic and astringent. By Dr. Walker it was found, when taken internally, to augment the force and frequency of the pulse, and increase the heat of the body. It is thought to possess remedial properties closely analogous to those of Peruvian bark, for which it has occasionally been successfully substituted in the treatment of intermittent fevers; but the introduction of sulphate of quinia into use, has nearly banished this, as well as many other substitutes for cinchona, from regular practice. The dogwood has also been employed with supposed benefit in typhoid fevers, and other complaints for which the Peruvian tonic is usually prescribed.

It may be given in powder, decoction, or extract. The dose of the powder is from a scruple to a drachm, repeated in cases of intermittent fever, so that from one to two ounces may be taken in the interval between the paroxysms. The decoction is officinal. (See *Decoctum Cornûs Floridæ.*) The dried bark is said to be preferable to the fresh; as it possesses all the activity of the latter, without being equally liable to offend the stomach and bowels.

Off. Prep. Decoctum Cornûs Floridæ. *U.S.* W.

CORNUS SERICEA. *U.S. Secondary.*

Swamp Dogwood.

"Cornus sericea. Cortex. *The bark.*" *U.S.*

Cornus. See CORNUS CIRCINATA.

Cornus sericea Willd. *Sp. Plant.* i. 663; Barton, *Med. Bot.* i. 115. This species of Cornus is usually six or eight feet in height, with numerous erect stems, which are covered with a shining reddish bark, and send out opposite spreading branches. The young shoots are more or less pubescent. The leaves are opposite, petiolate, ovate, pointed, entire, and on the under surface covered with soft brownish hairs. The flowers are small, white, and disposed in terminal cymes, which are depressed and woolly. The fruit consists of globular, berry-formed drupes, of a cerulean blue colour, and collected in bunches.

The swamp dogwood inhabits the United States from Canada to Carolina, and is found in moist woods, in swamps, and on the borders of streams. It flowers in June and July. The bark was ascertained by Dr. Walker to have the same medical properties with that of the Cornus Florida. It may be given in the same doses, and administered in a similar manner.

W.

COTULA. *U.S. Secondary.*

May-weed.

"Anthemis cotula. Planta. *The plant.*" *U.S.*

Camomille puante, Maroute, *Fr.;* Hunds-Kamille, Stinkende-Kamille, *Germ.;* Camomilla fetida, Cotula, *Ital.;* Manzanilla loca, *Span.*

Anthemis. See ANTHEMIS.

Anthemis Cotula. Willd. *Sp. Plant.* iii. 2181; Barton, *Med. Bot.* i. 161. The May-weed is an annual plant, with a fibrous root, and an erect striated stem, very much branched even to the bottom, from one to two feet in height, and supporting alternate, sessile, flat, doubly pinnated, somewhat hairy leaves, with pointed linear leaflets. The flowers stand singly upon the summits of the branches, and consist of a central, convex, golden-yellow disk, with white radial florets, which spread horizontally during the day, but are reflexed or bent towards the stem at night. The calyx, which is common to all the florets, is hemispherical, and composed of imbricated hairy scales. The receptacle is conical or nearly cylindrical, and surmounted by rigid, bristle-shaped paleæ, shorter than the florets. The seeds are naked.

This plant grows abundantly both in the United States and in Europe. In this country, it is found in the vicinity of inhabited places, growing among rubbish, along the sides of roads, and in waste grounds. Notwithstanding its extensive diffusion, it is generally believed to be a naturalized, not an indigenous plant. It is frequently called *wild chamomile*. It flowers from the middle of summer till late in autumn.

The whole plant has a strong, disagreeable smell, and a warm, bitter taste, and imparts these properties to water. We are not aware that its analysis has been attempted.

The medical properties of this species of Anthemis are essentially the same with those of chamomile, for which it may be employed as a substitute; but its disagreeable odour is an obstacle to its general use. On the continent of Europe, it has been given in nervous diseases, especially hysteria, under the impression, probably derived from its peculiar smell, that it possesses antispasmodic powers. It has also been thought to be emmenagogue. In the French Codex, it is ranked among the officinals; but neither of the British Colleges has adopted it, though abundant in Great Britain. In this country it is scarcely employed, except as a domestic remedy. The whole plant is active; but the flowers, being less disagreeable than the leaves, are preferred for internal use. The remedy is best administered in the state of infusion. W.

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CROCUS. *U.S.*

Saffron.

"Crocus sativus. Stigmata. *The stigmas.*" *U.S.*

Off. Syn. CROCI STIGMATA. Crocus sativus (Anglicus). Stigmata. *Lond.;* CROCI SATIVI STIGMATA. *Ed.;* CROCUS SATIVUS. Stigmata. *Dub.*

Safran, *Fr., Germ.;* Zafferano, *Ital.;* Azafran, *Span.*

Crocus. *Sex. Syst.* Triandria Monogynia.—*Nat. Ord.* Irideæ.

Gen. Ch. Corolla six parted, equal. *Stigmas* convoluted. *Willd.*

Crocus sativus. Willd. *Sp. Plant.* i. 194; Woodv. *Med. Bot.* p. 763. t. 259. The common cultivated saffron is a bulbous, perennial plant. From the bulb, which is rounded and depressed, the flower rises a little above the ground upon a long, slender, white, and succulent tube. It is large, of a beautiful lilac or bluish-purple colour, and makes its appearance in September or October. The leaves are radical, linear, slightly revolute, dark green upon their upper surface with a white longitudinal furrow in the centre, paler underneath with a prominent flattened midrib, and enclosed at their base, together with the tube of the corolla, in a membranous sheath, from which they emerge soon after the appearance of the flower. The style hangs out on one side between two segments of the corolla, and terminates in three long convoluted stigmas, which are of a rich orange colour, highly odorous, rolled in at the edges, and notched at the summit. These stigmas are the officinal part of the plant.

Botanists have found much difficulty in deciding which of the plants belonging to this genus are mere varieties of the *C. sativus*, and which are distinct species. Linnæus considered them all as varieties of the officinal species, but the *vernal crocus* is now almost universally recognised as distinct; and the number of species has been greatly multiplied by some authors.

The C. sativus, or *autumnal crocus*, is a native of Greece and Asia Minor, where it has been cultivated from the earliest ages of antiquity. It is also cultivated for medicinal use in Sicily, Spain, France, England, and other temperate countries of Europe. In Great Britain it has been found growing wild, but is not thought to be indigenous. Large quantities of saffron are raised in Egypt, Persia, and Cashmere, whence it is sent to India. We cultivate the plant in this country chiefly, if not solely, as a garden flower.

In England the flowers appear in October, and the leaves continue green through the winter; but the plant does not ripen its seed, and is propagated by offsets from the bulb. These are planted in grounds prepared for the purpose, and are arranged either in rows, or in small patches at certain distances. The flowers are gathered soon after they show themselves, as the period of flowering is very short. (*Fée.*) The stigmas, or summits of the pistils, are separated from the remainder of the flower, and carefully dried by artificial heat. During this process they are sometimes made to assume the form of a cake by pressure; but the finest saffron is that which has been dried loosely. Five pounds of the fresh stigmas yield one pound of the dried. (*Duncan.*) A field planted with saffron continues to be productive for three years.

The English saffron is most highly esteemed in this country. That imported from Spain is often impregnated with oil, said to be added under the impression that it conduces to the preservation of the drug. It is probable that the produce of other countries is sometimes sold under the name of English saffron. Much is imported from Gibraltar packed in canisters; and parcels are occasionally brought from Trieste and other ports of the Mediterranean.

The high price of this medicine gives rise to frequent adulterations. Water is said to be very often added in order to increase its weight. Sometimes the flowers of other plants, particularly the *Carthamus tinctorius* or safflower, and the *Calendula officinalis* or officinal marygold, are fraudulently mixed with the genuine stigmas. They may be known by their shape, which is rendered obvious by throwing a portion of the suspected mass into hot water, which causes them to expand. Other adulterations are the fibres of dried beef, the stamens of the Crocus distinguishable by their yellow colour, the stigmas previously exhausted in the preparation of the infusion or tincture, and various mineral substances easily detected upon close examination.

In the purchase of this medicine in cakes, those should be selected which are close, tough, and firm in tearing. Saffron should not be very moist, nor very dry, nor easily pulverized; nor should it emit an offensive smell when thrown on live coals. The freshest is the best, and that which is less than a year old should, if possible, be selected. It should possess in a high degree the characteristic properties of colour, taste, and smell. If it does not colour the fingers when rubbed between them, or has an oily feel, or a musty flavour, or a black, yellow, or whitish colour, it should be rejected.

As its activity depends, partly at least, on a volatile ingredient, it should be kept in well-stopped vessels. Some recommend that it should be enclosed in a bladder, and introduced into a tin case.

Properties. Saffron has a peculiar, sweetish, aromatic odour, a warm, pungent, bitter taste, and a rich deep orange colour, which it imparts to the saliva when chewed. Analyzed by Vogel and Bouillon-Lagrange, it afforded a very large proportion of a peculiar extractive matter, an odorous volatile oil, wax, gum, albumen, a small quantity of saline matter, besides water, and vegetable fibre. The extractive matter was named by them *polychroïte*, from the changes of colour which it undergoes by the action of reagents. It is prepared by evaporating the watery infusion to the consistence of honey, digesting the residue in alcohol, filtering the tincture, and evaporating it to dryness. Thus obtained, it is in the form of a reddish-yellow mass, of an agreeable smell, slightly bitter, soluble in water and alcohol, and somewhat deliquescent. Its solution becomes grass green by the action of nitric acid, blue and then violet by that of sulphuric acid, and loses its colour altogether on exposure to light, and by chlorine. According to M. Henry, Sen., it contains about 20 per cent. of volatile oil, which can be separated only by the agency of an alkali. When perfectly pure, it is of a brilliant red colour, soluble with difficulty in water which it renders yellow, and readily soluble in alcohol, and the fixed and volatile oils. M. Henry states that this colouring matter constitutes 42 per cent. of saffron, and the essential oil 10 per cent. It is to the latter that the medicine owes its active properties. It may be partially separated by distillation.

Medical Properties and Uses. Saffron was formerly considered highly stimulant and antispasmodic. It has been alleged, that in small doses it moderately excites the different functions, exhilarates the spirits, relieves pain, and produces sleep; in large doses, gives rise to headach, intoxication, delirium, stupor, and other alarming symptoms; and Shrœder asserts, that in the quantity of two or three drachms it proves fatal. It was thought also to act powerfully on the uterine system, promoting menstruation. The ancients employed it extensively, both as a medicine and condiment, under the name of *crocus*. It was also highly esteemed by the Arabians, and enjoyed considerable reputation among the physicians of modern Europe till within a comparatively recent period. On the continent it is still much used as a stimulant and emmenagogue. But the experiments of Dr. Alexander have proved it to possess little activity as a medicine; and in Great Britain and the United States it is seldom prescribed. By old women and nurses saffron tea is frequently used in exanthematous diseases, to promote the eruption; a practice introduced by the humoral pathologists, but afterwards abandoned by the profession, and not greatly injurious only from the inactivity of the medicine. The chief use of saffron at present is to impart colour and flavour to officinal tinctures. From ten to thirty grains may be given for a dose.

Off. Prep. Confectio Aromatica, *Lond.*, *Dub.;* Decoctum Aloës Compositum, *Lond.*, *Dub.;* Pilulæ Aloës et Myrrhæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Pilulæ è Styrace, *Dub.;* Syrupus Croci, *Lond.;* Tinctura Croci Sativa, *Ed.;* Tinct. Aloës et Myrrhæ, *U.S.*, *Lond.*, *Ed.;* Tinct. Cinchonæ Comp., *U.S.; Lond.*, *Ed.*, *Dub.;* Tinct. Rhei, *Lond.;* Tinct. Rhei et Sennæ, *U.S.;* Tinct. Rhei Comp., *Lond.*, *Dub.* W.

CUBEBA. *U.S.*

Cubebs.

"Piper cubeba. Fructus. *The fruit.*" *U.S.*

Off. Syn. CUBEBA. Piper Cubeba. Baccæ. *Lond.;* CUBEBA. PIPER CUBEBA. Fructus. *Dub.*

Cubebe, *Fr.;* Kubeben, *Germ.;* Cubebe, *Ital.;* Cubebas, *Span.;* Kebabeh, *Arab.*

PIPER. *Sex. Syst.* Diandria Trigynia.—*Nat. Ord.* Piperaceæ.

Gen. Ch. Calyx none. *Corolla* none. *Berry* one-seeded. *Willd.*

Piper Cubeba. Willd. *Sp. Plant.* i. 159. This is a climbing perennial plant, with a smooth, flexuous, jointed stem, and entire, ovate, oblong or lanceolate leaves, which in the old vine are unequal at the base, less than an inch long, and supported upon short channeled footstalks. The flowers are pedicelled, and form long, pendent spikes. The fruit is a berry which grows in clusters.

This species of Piper is a native of Java, where it grows luxuriantly in the woods, and furnishes much of the cubebs of commerce. It flourishes also in Nepaul; and is said to be found in the Isles of Bourbon and France, and in Guinea. It is not cultivated.

Properties. Cubebs are round, about the size of a small pea, of a blackish or grayish-brown colour, and furnished with a short stalk, which appears to be continuous with raised veins that run over the surface of the berry, and embrace it like a net work. The shell is hard, almost ligneous, and contains within it a single loose seed, covered with a blackish coat, and internally white and oleaginous. The odour of the berry is agreeably aromatic; the taste, warm, bitterish, and camphorous, leaving in the mouth a peculiar sensation of coolness, like that produced by the oil of peppermint. The powder is dark coloured, and of an oily aspect. From 1000 parts of cubebs, M. Monheim obtained 30 parts of a ceruminous substance, 25 of a green volatile oil, 10 of a yellow volatile oil, 45 of *cubebin*, 15 of a balsamic resin, 10 of chloride of sodium, 60 of extractive, and 650 of lignin, with 155 parts lost. The cubebin appears to be identical with piperin.—(*Journ. de Pharm.* xx. 403.) The oil may be obtained separate by distillation with water. It is colourless, yellowish, or greenish, of a feeble aromatic odour, of a warm camphorous aromatic taste, lighter than water, and of a consistence approaching that of almond oil. Exposed to the air it is said to thicken without losing its odour. It sometimes deposites crystals upon standing. Baumé obtained two ounces and two drachms from twelve and a half pounds (French weight) of the berries. (*Fée.*) To Schönwald, ten pounds of the berries yielded eleven ounces of oil. (*Duncan.*) Cubebs gradually deteriorate by age; and in the state of powder become rapidly weaker, in consequence of the escape of their active volatile ingredient. They should always be kept whole, and pulverized at the time of dispensing them. The powder is said to be sometimes adulterated with that of pimento.

Medical Properties and Uses. Cubebs are gently stimulant, with a special direction to the urinary organs. In considerable quantities they usually excite the circulation, increase the heat of the body, and sometimes occasion headach and giddiness. At the same time they frequently produce an augmented flow of the urine, to which they impart a peculiar odour. Nausea and moderate purging are also occasional attendants upon their operation; and they are said to give rise to a sense of coolness in the rectum during the passage of the feces. We have no evidence that they were known to the ancients. They were probably first brought into Europe by the Arabians; and were formerly employed for similar purposes with the black pepper; but they were found much less powerful and fell into disuse. Some years since they were again brought into notice in England as a remedy in gonorrhœa, and have been found very efficient in this complaint by numerous practitioners, not only of Great Britain, but of the continent of Europe and of the United States. This application of cubebs was derived from India, where they have long been used in gonorrhœa, gleet, and leucorrhœa, and as a grateful stomachic and carminative in disorders of the digestive organs. They are said to have occasionally produced swelled testicle when given in the first mentioned complaint; and though recommended in all its stages, will probably be found most safe and effectual in cases where the inflammatory action is confined to the mucous membrane of the urethra. If not speedily useful, they should be discontinued. They are best administered in the form of powder, of which the dose is from one to three drachms, repeated three or four times a day. The volatile oil is sometimes substituted in the dose of ten or twelve drops, suspended in water by the intervention of sugar.

In Loudon's Encyclopædia of Plants it is stated, that the berries of the Uvaria Zeylanica of Ceylon are used as a specific for gonorrhœa, under the name of cubebs. They are, however, wholly different from the genuine drug; and may be distinguished by containing four seeds in each berry, while the latter has but one. W.

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CUMINI SEMINA. *Lond.*

Cumin Seed.

"Cuminum Cyminum. *Semina.*" *Lond.*

Cumin, *Fr.;* Römischer Kümmel, *Germ.;* Comino, *Ital., Span.*

Cuminum. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferæ.

Gen. Ch. *Fruit* ovate, striated. *Partial umbels* four. *Involucres* four-cleft.

Cuminum Cyminum. Willd. *Sp. Plant.* i. 1440; Woodv. *Med. Bot.* p. 142. t. 56. This is an annual plant, about six or eight inches high, having a round, slender, branching stem, with numerous narrow, linear, pointed, smooth, grass-like leaves, of a deep green colour. The flowers are white or purple, and disposed in numerous terminal umbels, which have very few rays, and are attended with general and partial involucres, consisting of three or four linear leaflets. The fruit consists of two oblong plano-convex seeds, united by their flat sides. The plant is a native of Egypt, but is cultivated for its seeds in Sicily, Malta, and other parts of Europe.

The cumin seeds of the shops are elliptical, flat on one side, convex, furrowed, and rough on the other, about one-sixth of an inch in length, and of a light-brown colour. Two are sometimes united together as upon the plant. Their odour is peculiar, strong, and heavy; their taste warm, bitterish, aromatic, and disagreeable. They contain much essential oil, which is lighter than water, of a yellowish colour, and has the sensible properties of the seeds.

Medical Properties and Uses. In medical properties they resemble the other aromatic seeds of umbelliferous plants, but are more stimulating. They are seldom used in the United States, and appear to be retained by the London College, merely as an ingredient in a stimulant and discutient officinal plaster.

Off. Prep. Emplastrum Cumini. *Lond.* W.

CUPRUM.

Copper.

Cuivre, *Fr.;* Kupfer. *Germ.;* Rame, *Ital.;* Cobre, *Span.*

This metal is not officinal in the metallic state, in which it is never used in medicine; but it furnishes several important preparations.

Copper is very generally diffused in nature, and exists principally in four states; as native copper, as an oxide, as a sulphuret, and as a salt. Its principal native salts are the sulphate, carbonate, arseniate, and phosphate. In the United States it has been found in various localities, but most abundantly in New-Jersey, and in the North-West Territory. The principal copper mines in the world, are those of the Pyrenees in France, Cornwall in England, and Fahlun in Sweden.

Properties. Copper is a brilliant, sonorous metal, of a reddish colour, and very ductile, malleable, and tenacious. It has a slightly nauseous taste, and emits a disagreeable smell when rubbed. Its texture is granular, and its fracture hackly. Its sp. gr. is 8.89, and its fusing point, 1996 F. according to Daniell; being intermediate in fusibility between silver and gold. Its equivalent number is 31.6. Exposed to the air it undergoes a slight tarnish. Its combinations are numerous and important. With oxygen it forms two well characterized oxides, a suboxide, or dioxide, of a red colour, consisting of two equiv. of copper and one of oxygen; and a protoxide of a black colour, formed of one equiv. of metal and one of oxygen. The latter oxide, which alone is salifiable, forms with acids several salts, important in medicine and the arts. With metals copper forms numerous alloys, of which that with zinc, called brass, is the most useful. When copper is in solution, it may be readily detected by the immersion of a bright plate of iron, which immediately becomes covered with a film of metallic copper.

Action on the Animal Economy. Copper, in its pure state, is perfectly inert; but in combination is highly deleterious. Nevertheless a trace of it has been detected by M. Sarzeau in the blood. Its combinations when taken in poisonous doses, produce a coppery taste in the mouth; nausea and vomiting; violent pain of the stomach and bowels; frequent, black, and bloody stools; small, irregular, sharp, and frequent pulse; faintings; burning thirst; difficulty of breathing; cold sweats; paucity of urine; violent headach; cramps, convulsions, and finally death. The best treatment in cases of poisoning by copper, is to neutralize the poison by the whites of eggs, diffused in water, and administered in large and repeated doses. If this remedy be not at hand, the patient must in the mean time be gorged with warm or even cold water, or with some emollient decoction, and the throat irritated by the finger or a feather, with a view to excite vomiting. Should vomiting not take place by these means, the stomach-pump may be employed. Sugar, formerly recommended as an antidote by Orfila on the authority of M. Marcelin Duval, is now considered by the former to have the power merely of calming irritation after vomiting has taken place, and to be far inferior to albumen, which, by decomposing the cupreous preparation, acts as a true counterpoison.

After the foregoing statements we need hardly add, that the use of vessels of copper should be discontinued in all operations connected with pharmacy and domestic economy; for although the metal, uncombined, is innocuous, yet the risk is great that they may be acted on, in which event, whatever may be contained in them would be rendered deleterious.

Pharm. Prep. The following is a list of all the preparations containing copper, in the U. S. and British Pharmacopœias, arranged so as to exhibit the synonymes.

Cupri Acetas. Crystalli. *Dub.*
Cupri Acetas, *U.S.;* Ærugo, *Lond.;* Sub-Acetas Cupri, *Ed.;* Cupri Subacetas, *Dub.* Anglicè, *Verdigris.*
Cupri Acetas Præparatus, *U.S.;* Cupri Subacetas Præparatum, *Dub.* Anglicè, *Prepared verdigris.*
  Unguentum Cupri Acetatis, *U.S.;* Unguentum Sub-Acetatis Cupri, *Ed.;* Unguentum Cupri Subacetatis, *Dub.*
  Oxymel Cupri Subacetatis, *Dub.;* Linimentum Æruginis, *Lond.*
  Emplastrum Cantharidis Vesicatoriæ Compositum, *Ed.*
Cupri Sulphas, *U.S.*, *Lond.*, *Dub.;* Sulphas Cupri, *Ed.*
  Solutio Sulphatis Cupri Composita, *Ed.*
Cuprum Ammoniatum, *U.S. Lond.*, *Dub.;* Ammoniaretum Cupri, *Ed.*
  Liquor Cupri Ammoniati, *Lond.;* Cupri Ammoniati Aqua, *Dub.*
  Pilulæ Ammoniareti Cupri, *Ed.* B.

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CUPRI ACETAS. *U.S.*

Acetate of Copper.

Off. Syn. ÆRUGO, *Lond.;* SUB-ACETAS CUPRI, *Ed.;* CUPRI SUBACETAS, *Dub.*

Verdigris; Acetate de cuivre brut, Vert-de-gris, *Fr.;* Grünspan, *Germ.;* Verde rame, *Ital.;* Cardenillo, *Span.*

Preparation. Verdigris is prepared in large quantities in the South of France, more particularly in the neighbourhood of Montpelier. It is also manufactured in Great Britain and Sweden. In France the process is conducted in the following manner. Sheets of copper are stratified with the refuse of the grape which remains after the expression of the juice in making wine, and allowed to remain in this state for a month or six weeks. At the end of this time, the plates are found coated with a considerable quantity of verdigris. This is scraped off, and the plates are then replaced as at first, to be further acted on. The scrapings thus obtained form a paste, which is afterwards well beaten with wooden mallets, and packed in oblong leathern bags, about ten inches in length by eight in breadth, in which it is dried in the sun, until the loaf of verdigris, as it is called, attains the proper degree of hardness. The rationale of the process is easily understood. The grape-refuse contains a considerable quantity of juice, which, by contact with the air, undergoes the acetous fermentation. The copper becomes oxidized, and by subsequent combination with the acetic acid generated during the fermentation, forms the acetate of copper or verdigris. In England a purer verdigris is prepared by covering copper plates with cloth soaked in pyroligneous acid.

Verdigris comes to this country exclusively from France, being imported principally from Bordeaux and Marseilles. The leathern packages in which it is put up, called sacks of verdigris, weigh generally from twenty-five to thirty pounds, and arrive in casks, each containing from thirty to forty sacks.

Properties. Verdigris is in masses, of a pale green colour, and composed of a multitude of minute silky crystals. Sometimes, however, it occurs of a bright blue colour. Its taste is coppery. It is insoluble in alcohol, and by the action of water, a portion of it is resolved into the neutral acetate which dissolves, and a subacetate, containing three equiv. of base, which remains behind in the form of a dark green powder, gradually becoming black. It is hence evident, that when verdigris is prepared by levigation with water, it is altered in its nature. The neutral acetate is the crystallized acetate of copper of the Dublin College (see *Cupri Acetas. Crystalli*); while the above mentioned subacetate may be viewed as identical with the prepared verdigris (see *Cupri Acetas Præparatus*). When acted on by sulphuric acid, it is decomposed with effervescence, vapours of acetic acid being evolved, easily recognised by their vinegar odour. The verdigris of commerce generally contains from a half to two per cent. of impurities, consisting of particles of copper, and the husks and stones of the grape. When of good quality, it has a lively green colour, is free from black or white spots, and is dry and difficult to break. The green rust, called in popular language verdigris, which copper vessels are apt to contract when not kept clean, is a carbonate of copper, and must not be confounded with real verdigris.

Composition. Verdigris, apart from its impurities, is a variable mixture of the subacetates of copper; the sesquibasic acetate characterizing the green variety, the diacetate the blue. When acted on by water, the portion consisting of diacetate is converted into soluble neutral acetate, and insoluble tribasic acetate, as above mentioned.

Medical Properties and Uses. Verdigris acts as an emetic, and is said also to possess tonic properties. As an emetic it is prompt in its action, and not without danger. Externally it acts as a detergent and escharotic, and is occasionally applied to ulcers attended with fungus, or to callous edges. Its dose as a tonic is from an eighth to a quarter of a grain, and as an emetic, from one to two grains; but it is very seldom employed internally; and considering its irritating nature, it has very properly fallen into disuse. For its effects as a poison, and the mode of treatment, the reader is referred to the article *Cuprum.*

Off. Prep. Cupri Acetas Præparatus, *U.S.*, *Dub.;* Emplastrum Cantharidis Vesicatoriæ Compositum, *Ed.;* Linimentum Æruginis, *Lond.;* Unguentum Sub-Acetatis Cupri, *Ed.*

B.

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CUPRI ACETAS. Crystalli. *Dub.*

Crystals of Acetate of Copper.

Distilled verdigris, Crystals of Venus, neutral acetate of copper; Cristaux de Vénus, Verdet crystallisé, *Fr.;* Destillirter Grünspan, Kupferkrystallen, *Germ.*

Crystallized acetate of copper is prepared principally at Montpelier in France. The verdigris which is made in private houses is collected and carried to the manufactory. It is there dissolved in vinegar by the assistance of heat, and the solution, after having been sufficiently concentrated, is transferred to suitable vessels, where it crystallizes on cooling. The crystallization is facilitated by inserting sticks in the liquid, split in four longitudinally, the several portions being kept apart by small wedges of wood. On these the crystals are deposited.

This salt has a deep blue colour and strong styptic taste, crystallizes in rhomboidal prisms, and effloresces slightly in the air. It dissolves in water without residue, a character which serves to distinguish it from verdigris. It consists of one equivalent of acetic acid, one of protoxide of copper, and one of water. Its popular name of distilled verdigris is highly improper, as no distillation is practised in its preparation.

Medical and Pharmaceutical Uses. It is not very obvious for what reason the Dublin College has included this among its officinal preparations. It possesses similar medical properties with verdigris; but being more active and poisonous, must be used in smaller doses. It is sometimes used in pharmacy for the purpose of obtaining acetic acid, which may be disengaged from it by the action of sulphuric acid; and the larger proportional quantity of acetic acid which it contains, makes it more eligible for this purpose than verdigris. It enters into no officinal preparation. B.

CUPRI SULPHAS. *U.S., Lond., Dub.*

Sulphate of Copper.

Off. Syn. SULPHAS CUPRI. *Ed.*

Blue vitriol; Sulfate de cuivre, Vitriol bleu, Couperose bleu, *Fr.;* Schwefelsaures Kupfer, Kupfervitriol, Blauervitriol, Blauer Galitzenstein, *Germ.;* Rame solfato, Vitriolo di rame, Vitriolo di Cipro, *Ital.;* Sulfato de cobre, Vitriolo azul, *Span.*

Preparation, &c. Sulphate of copper occasionally exists in nature, and generally in solution in the water which flows through copper mines. It is obtained artificially by three principal methods. One method consists in merely evaporating the waters which naturally contain the salt in solution. Another is to roast the native sulphuret in a reverberatory furnace, whereby it is made to pass, by absorbing oxygen, into the state of sulphate. The roasted mass is lixiviated, and the solution obtained evaporated that crystals may form. The salt procured by either of these methods, contains a little sulphate of the peroxide of iron, from which it may be freed by adding an excess of protoxide of copper, which has the effect of precipitating the iron. The third method alluded to is pursued in France. It consists in wetting, and then sprinkling with sulphur, sheets of copper, which are next heated to redness for some time, and afterwards plunged into water while yet hot. The same operation is repeated until the sheets are entirely corroded. At first a sulphuret is formed, which by the action of heat and air gradually passes into the state of sulphate. This is dissolved in the water, and is obtained in crystals by evaporation.

On account of the duty upon sulphate of copper, none of it is at present imported into the United States, the whole demand being supplied from our own laboratories. The process for making it generally pursued in this country, is by direct combination between old scrap copper and sulphuric acid.

Properties. Sulphate of copper has a rich deep-blue colour and strong metalline styptic taste. It reddens vegetable blues, and crystallizes in large, transparent, rhomboidal prisms, which effloresce slightly in the air, and are soluble in four parts of cold, and two of boiling water, but insoluble in alcohol. When heated, it first melts in its water of crystallization, and then dries and becomes white. If the heat be increased, it next undergoes the igneous fusion; and finally, at a high temperature, loses its acid, protoxide of copper being left. Potassa, soda, and ammonia throw down from it a bluish-white precipitate of hydrated protoxide of copper, which is immediately dissolved by an excess of the last mentioned alkali, forming a rich deep-blue solution, called in early pharmacy, *aqua sapphirina.* It is also decomposed by the alkaline carbonates, and by a number of important salts, such as borax, acetate and subacetate of lead, acetate of iron, nitrate of silver, corrosive chloride of mercury, tartrate of potassa, and muriate of lime; and it is precipitated by all astringent vegetable infusions. Of course it must not be associated in prescription with any of these substances. It consists of one equivalent of sulphuric acid, one of protoxide of copper, and five of water.

Medical Properties. Sulphate of copper, in small doses, is deemed astringent and tonic; in large ones, a prompt emetic. With a view to its tonic effect it has been given in intermittent fever, as well as in epilepsy and some other spasmodic diseases; and as an emetic, for discharging poisons from the stomach, especially opium. It has been used also as an emetic in incipient phthisis, but its effects in that disease are probably worse than useless. In croup it has been employed as an emetic with encouraging success in a number of cases by Drs. Serlo and Malin. In one case in which the ordinary remedies were tried without affording much relief, a cure was effected by an emetic of the sulphate, which produced the discharge of the false membrane. (*N. Amer. Arch.* I. 159, from *Hufeland's Journal* for Jan. 1834.) In small doses it has of late been highly recommended in chronic diarrhœa. Externally it is employed in solution as a stimulant to ill-conditioned ulcers, as an escharotic for destroying warts, fungus, and callous edges, and as a styptic to bleeding surfaces. In weak solution, either alone or associated with other substances, it forms a useful collyrium in the chronic stages of some forms of ophthalmia. Eight grains of it, mixed with an equal weight of Armenian bole, and two grains of camphor, and added to half a pint of boiling water, forms, after becoming limpid by standing, a collyrium strongly recommended by Mr. Ware, as a substitute for *Bates's Aqua Camphorata*, in the purulent ophthalmia of infants. The dose as a tonic is a quarter of a grain, gradually increased; as an emetic, from two to five grains. Orfila cautions against giving large doses of this salt as an emetic in cases of poisoning, as it is apt, from its poisonous effects, to increase the mischief. Upon the whole, such is the activity of the sulphate of copper, that it ought to be exhibited with the greatest caution. For its effects as a poison, see *Cuprum.*

Off. Prep. Cuprum Ammoniatum, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Solutio Sulphatis Cupri Composita, *Ed.* B.

CURCUMA. *U.S. Secondary.*

Turmeric.

"Curcuma longa. Radix. *The root.*" *U.S.*

Off. Syn. CURCUMA LONGA. Radix. *Dub.*

Safran des Indes, *Fr.;* Kurkuma, Gilbwurz, *Germ.;* Curcuma, *Ital.*, *Span.;* Zirsood *Arab.;* Huldie, *Hindoo.*

Curcuma. *Sex. Syst.* Monandria Monogynia.—*Nat. Ord.* Scitamineæ.

Gen. Ch. Both limbs of the corolla three-partite. *Anther* with two spurs at the base. *Seeds* with an arillus. *Loudon's Encyc.*

The roots of several species of Curcuma have been employed in medicine. Two varieties of *zedoary*—an aromatic tonic formerly admitted into the officinal lists of the London and Dublin Colleges, but now discarded—are ascribed to this genus, one to the *C. Zedoaria* of Roscoe, the other to the *C. Zerumbet* of Roxburgh. We are informed that from the tubers of several species, a very pure starch, similar to arrow-root, is prepared, and used in some parts of India, especially in Travancore. But the only species at present acknowledged as officinal, in either of the British Pharmacopœias, or in our own, is the *C. longa*, or turmeric plant.

Curcuma longa. Willd. *Sp. Plant.* i. 14; Woodv. *Med. Bot.* p. 737. t. 252. The root of this plant is perennial, tuberous, palmate, and internally of a deep yellow or orange colour. The leaves are radical, large, lanceolate, obliquely nerved, sheathing at their base, and closely embrace each other. The scape or flower-stem, which rises from the midst of the leaves, is short, thick, smooth, and constitutes a spike of numerous imbricated bracteal scales, between which the flowers successively make their appearance. The plant is a native of the East Indies and Cochin-China, and is cultivated in various parts of Southern Asia, particularly in Bengal and Java, whence the root is exported.

The dried root is in cylindrical or oblong pieces, about as thick but not as long as the finger, tuberculated, somewhat contorted, externally yellowish-brown, internally deep orange-yellow, hard, compact, and breaking with a fracture like that of wax. Another variety, comparatively rare, is round or oval, about the size of a pigeon's egg, and marked externally with numerous annular wrinkles. It is distinguished by the name of *curcuma rotunda*, the former being called *curcuma longa*. The two varieties have a close resemblance in sensible properties, and are thought to be derived from the same plant, though formerly ascribed to different species of Curcuma. The odour of tumeric is peculiar; the taste warm, bitterish, and feebly aromatic. It tinges the saliva yellow, and affords an orange-yellow powder. Analyzed by Pelletier and Vogel, it was found to contain lignin, starch, a peculiar yellow colouring matter, a brown colouring matter, gum, an odorous and very acrid volatile oil, and a small quantity of muriate of lime. The peculiar colouring principle is reddish-brown in the concrete state, yellow when minutely divided, heavier than water, of an acrid and pungent taste like that of pepper, but slightly soluble in water, very soluble in alcohol, ether, and the oils. The alkalies rapidly change its colour to a reddish-brown; and paper tinged with tincture of turmeric is employed as a test of the presence of these bodies. Berzelius, however, states that its colour is changed to red or brownish-red by the concentrated mineral acids, by pure boracic acid, especially when dissolved in alcohol, and by numerous metallic salts; so that its indications cannot be certainly relied on. Turmeric is used for dyeing yellow; but the colour is not permanent.

Medical Properties, &c. This root is a stimulant aromatic, bearing some resemblance to ginger in its operation, and is much used in India as a condiment. It is a constant ingredient in the curries so generally employed in the East. In former times it had some reputation in Europe as a remedy in jaundice and other visceral diseases; but at present is employed only to impart colour to ointments, and other pharmaceutic preparations. W.

CYDONIÆ SEMINA. *Lond.*

Quince Seeds.

"Pyrus Cydonia. *Semina.*" *Lond.*.

Semences de coings, *Fr.;* Quittenkerne, *Germ.;* Semi di cotogno, *Ital.;* Simiente de membrillo, *Span.*

The quince tree has been separated from the genus *Pyrus* and erected into a new one with the title *Cydonia,* which is now generally admitted by botanists. It differs from the Pyrus in the circumstance that the cells of its fruit contain many seeds, instead of two only as in the latter.

Cydonia. *Sex. Syst.* Icosandria Pentagynia.—*Nat. Ord.* Pomaceæ.

Gen. Ch. *Calyx* five-parted, with leafy divisions. *Apple* closed, many-seeded. *Testa* mucilaginous. *Loudon's Encyc.*

Cydonia vulgaris. Pers. *Enchir.* ii. 40.—*Pyrus Cydonia.* Willd. *Sp. Plant.* ii. 1020; Woodv. *Med. Bot.* p. 505. t. 182. The common quince tree is characterized as a species by its downy deciduous leaves. It does not require particular description. It is supposed to have been originally obtained from Crete, but grows wild in Austria, on the banks of the Danube. It is abundantly cultivated in this country. The fruit is about the size of a pear, yellow, downy, of a pleasant odour, a rough, astringent, acidulous taste; and in each of its five cells contains from eight to fourteen seeds. Though not eaten in its raw state, it forms a very pleasant confection; and a syrup prepared from it may be used as a grateful addition to drinks in sickness, especially in looseness of the bowels, which it is supposed to restrain by its astringency. The seeds are the officinal portion.

They are ovate, angled, of a reddish-brown colour externally, white within, inodorous, and nearly insipid, being slightly bitter when long chewed. Their coriaceous envelope, abounds in mucilage, which is extracted by boiling water. Two drachms of the seeds are sufficient to render a pint of water thick and ropy. It has been proposed by a German pharmaceutist to evaporate the decoction to dryness, and powder the residue. Three grains of this powder form a sufficiently consistent mucilage with an ounce of water

Medical Properties, &c. The mucilage of quince seeds may be used for all the purposes to which other mucilaginous liquids are applied. It is preferred by some practitioners as a local application in conjunctival ophthalmia; but in this country is less used for this purpose than the infusion of sassafras pith.

Off. Prep. Decoctum Cydoniæ, *Lond.* W.

DELPHINIUM. *U.S. Secondary.*

Larkspur.

"Delphinium consolida. Radix. *The root.*" *U.S.*

Pied d'allouette, *Fr.;* Feld-Rittersporn, *Germ.*

Delphinium. *Sex. Syst.* Polyandria Trigynia—*Nat. Ord.* Ranunculaceæ.

Gen. Ch. *Calyx* none. *Petals* five. *Nectary* bifid, horned behind. *Pods* three or one. *Willd.*

Delphinium consolida. Willd. *Sp. Plant.* ii. 1226; Loudon's *Encyc. of Plants*, p. 473. 7832. The larkspur is a showy annual plant, with an erect, branched, slightly pubescent stem. Its leaves are divided into linear segments, widely separated, and forked at the summit. The flowers are usually of a beautiful azure blue colour, and disposed in loose terminal racemes, with peduncles longer than the bractes. The nectary is one-leaved, with an ascending horn nearly equalling the corolla. The seeds are contained in smooth, solitary capsules.

This species of larkspur has been introduced from Europe into this country, where it has become naturalized, growing in the woods and fields, and flowering in June and July.

Various parts of the larkspur have been employed in medicine; and the plant is said to have properties closely analogous to those of the *Delphinium Staphisagria.* (See *Staphisagriæ Semina.*) The flowers are bitter and acrid, and having formerly been supposed to possess the power of healing wounds, gave the name of *consolida* to the species. They were considered diuretic emmenagogue, and vermifuge; but are not now used. The seeds are very acrid, are esteemed diuretic, and in large doses produce vomiting and purging. A tincture prepared by macerating an ounce of the seeds in a pint of diluted alcohol, has been found useful in spasmodic asthma and dropsy. The dose is ten drops, to be gradually increased till some effects upon the system are evinced. The remedy has been employed both in America and England; and the seeds of an indigenous species, the *D. exaltatum*, have been applied to a similar purpose. The root probably possesses the same properties with other parts of the plant; but, though designated in the Pharmacopœia, is little if at all used. W.

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DIANTHI CARYOPHYLLI FLORES. *Ed.*

Flowers of the Clove Pink.

Off. Syn. DIANTHUS CARYOPHYLLUS. Flores. *Dub.*

Dianthus. *Sex. Syst.* Decandria Digynia.—*Nat. Ord.* Caryophylleæ.

Gen. Ch. *Calyx* cylindrical, one-leafed, with four scales at the base. *Petals* five, with claws. *Capsule* cylindrical, one-celled. *Willd.*

Dianthus Caryophyllus. Willd. *Sp. Plant.* ii. 674; Woodv. *Med. Bot.* p. 579. t. 205. The *clove pink* or *carnation* is too well known to require minute description. It is a perennial, herbaceous plant, characterized as a species by its branching stem; its solitary flowers; the short ovate scales of its calyx; its very broad, beardless petals; and its linear, subulate, channeled, glaucous leaves. Indigenous in Italy, it is every where cultivated in gardens for the beauty of its flowers, of which numerous varieties have been produced by horticulturists. Those are selected for medicinal use which have the deepest red colour, and the most aromatic odour. The petals should not be collected till the flower is fully blown, and should be employed in the recent state.

They have a fragrant odour said to resemble that of the clove. Their taste is sweetish, slightly bitter, and somewhat astringent. Both water and alcohol extract their sensible properties, and they yield a fragrant essential oil by distillation.

In Europe they are employed to impart colour and flavour to a syrup which serves as a vehicle for other less pleasant medicines.

Off. Prep. Syrupus Dianthi Caryophylli, *Ed.* W.

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DIGITALIS. *U.S.*

Foxglove.

"Digitalis purpurea. Folia. *The leaves.*" *U.S.*

Off. Syn. DIGITALIS FOLIA et SEMINA. Digitalis purpurea. Folia et Semina. *Lond.;* DIGITALIS PURPUREÆ FOLIA. *Ed.;* DIGITALIS PURPUREA. Folia, *Dub.*

Digitale pourprée, Doightier, *Fr.;* Purpurrother Fingerhut, *Germ.;* Digitale purpurea, *Ital.;* Dedalera, *Span.*

DIGITALIS. *Sex. Syst.* Didynamia Angiospermia.—*Nat. Ord.* Scrophularineæ.

Gen. Ch. *Calyx* five-parted. *Corolla* bell-shaped, five-cleft, ventricose. *Capsule* ovate, two-celled. *Willd.*

Digitalis purpurea. Willd. *Sp. Plant.* iii. 283; Woodv. *Med. Bot.* p. 218. t. 78. Foxglove is a beautiful plant, with a biennial or perennial, fibrous root, which sends forth large tufted leaves, and a single, erect, downy, and leafy stem, rising from two to five feet in height, and terminating in an elegant spike of purple flowers. The lower leaves are ovate, pointed, about eight inches in length, and three in breadth, and stand upon short, winged footstalks; the upper are alternate, sparse, and lanceolate; both are obtusely serrated at their edges, and have wrinkled velvety surfaces, of which the upper is of a fine deep-green colour, the under paler and more downy. The flowers are numerous, and attached to the upper part of the stem by short peduncles, in such a manner as generally to hang down upon one side. At the base of each peduncle is a floral leaf, which is sessile, ovate, and pointed. The calyx is divided into five segments, of which the uppermost is narrower than the others. The corolla is monopetalous, bell-form, swelling on the lower side, irregularly divided at the margin into short obtuse lobes, and in shape and size bearing some resemblance to the end of the finger of a glove, a circumstance which has suggested most of the names by which the plant is designated in different languages. The mouth of the corolla is guarded by long, soft hairs. Its general colour is bright purple; but sometimes the flowers are whitish. The internal surface is sprinkled with black spots upon a white ground. The filaments are white, curved, and surmounted by large yellow anthers. The style, which is simple, supports a bifid stigma. The seeds are very small, numerous, of a dark colour, and contained in a pyramidal, two-celled capsule.

The foxglove grows wild in most of the temperate countries of Europe, where it flowers in the middle of summer. In this country it is cultivated both as an ornamental garden plant, and for medicinal purposes. The leaves are the part usually employed, although the London College recognises the seed also as officinal. Much care is requisite in selecting, preparing, and preserving foxglove in order to insure its activity. The leaves should be gathered in the second year, immediately before or during the period of inflorescence, and those only should be chosen which are full grown and perfectly fresh. (*Geiger.*) It is said that those plants are preferable which grow spontaneously in elevated places, exposed to the sun. (*Duncan.*) As the leaf-stalk and midrib are comparatively inactive, they may be rejected. The leaves should be dried either in the sunshine, or by a gentle heat before the fire; and care should be taken to keep them separate during the drying process. It is probably owing to the want of proper attention in preparing digitalis for the market, that it is so often found to be inefficient. Much of the medicine kept in our shops is obtained from the settlement of the Shakers in New York, and is in the state of oblong compact masses, into which the leaves are probably compressed before they are thoroughly dried; at least the cakes when opened are not unfrequently found to be somewhat mouldy. This mode of preparing the drug is highly objectionable; and it is not surprising that our practitioners are so frequently disappointed in its effects. A comparison of the sensible properties of digitalis in this state, with those of the carefully dried leaves imported from England, will at once evince the great superiority of the latter. It is, indeed, highly probable, that the wild plant in its native country attains greater medicinal perfection, than that which is cultivated in a foreign soil. The dried leaves should be kept in tin canisters, well closed so as to exclude light and moisture, or they may be pulverized, and the powder preserved in well-stopped and opaque phials.

Properties. Foxglove is without smell in the recent state, but acquires a faint narcotic odour when dried. Its taste is bitter and nauseous. The colour of the dried leaf is a dull pale green, modified by the whitish down upon the under surface; that of the powder is a fine deep green. Digitalis yields its virtues both to water and alchohol. The dried leaves, analyzed by Rein and Haase, were found to contain in 100 parts, 5.5 of a green resin, soft, viscid, soluble in alcohol, ether, and the volatile oils, and possessing the properties of a mixture of resin and fixed oil; 15.0 of gum mixed with a salt of potassa; 2.0 of superoxalate of potassa; 52.0 of lignin; 5.5 of water, with 5.0 parts lost. According to Haase, the virtues of digitalis depend upon the soft resin. (*Berzelius, Trait. de Chim.*) MM. Brault and Poggiale state, as the result of their researches, that the leaves contain chlorophylle, resin, a fatty matter, starch, vegetable fibre, gum, tannin, a volatile oil, and salts of lime and of potassa. They are disposed to ascribe the virtues of the plant chiefly to the resin, which has a bitter, acid, almost corrosive taste. The pretended *digitalin* of M. Le Royer has turned out to be nothing more than a mixture of chlorophylle, resin, fatty matter, and different salts of lime and of potassa. (*Journ. de Pharm.* xxi. 130.)

Medical Properties and Uses. Digitalis is narcotic, sedative, and diuretic. When administered in quantities sufficient to bring the system under its influence, it produces a sense of tightness or weight with dull pain in the head, vertigo, dimness or other disorder of vision, and more or less confusion in the mental operations. At the same time, it occasionally gives rise to irritation in the pharynx and œsophagus, which extends to the larynx and trachea, producing hoarseness; and in more than one instance ptyalism has been observed to result from its action. It sometimes also disturbs the bowels, and excites nausea, or even vomiting. Another effect, which, in a practical point of view, is perhaps the most important, is an augmented flow of urine. This has been ascribed by some to the increased absorption which digitalis is supposed to produce; and in support of this opinion it is stated, that its diuretic operation is observable only when dropsical effusion exists; but the fact seems to be, that it is capable of augmenting the quantity of urine in health, and it probably exerts a directly stimulating influence over the secretory function of the kidneys. This influence is said sometimes to extend to the genital organs.* Besides the various effects above detailed, most of which indicate the existence of a stimulating power, digitalis exerts a remarkably sedative operation upon the heart. This is exhibited in the reduction both of the force and frequency of the pulse, which sometimes sinks from the ordinary standard to 50, 40, or even 30 strokes in the minute. In some instances, however, it undergoes little change; in others only becomes irregular; and we are told that it is even occasionally increased in frequency. It was observed by Dr. Baildon, that the effects of digitalis upon the circulation were very much influenced by posture. Thus, in his own case, the pulse which had been reduced from 110 to 40 in the recumbent position, was increased to 72 when he sat, and to 100 when he stood. We do not discover any thing remarkable in this circumstance. It is well known that the pulse is almost always more frequent in the erect than in the horizontal posture, and the difference is greater in a state of debility than in health. Digitalis diminishes the frequency of the pulsations of the heart by a directly debilitating power; and this very debility, when any exertion is made which calls for increased action in that organ, causes it to attempt by an increase in the number of its contractions, to meet the demand which it is wholly unable to supply by an increase in their force.

The various effects above detailed may result from digitalis given in doses calculated to produce its remediate influence. In larger quantities its operation is more violent. Nausea and vomiting, stupor or delirium, cold sweats, extreme prostration of general strength, hiccough, convulsions, syncope, are among the alarming symptoms which indicate the poisonous character of the medicine. These effects are best counteracted by stimulants, such as brandy, the volatile alkali, and opium. When there is reason to believe that any of the poison remains, it is obviously proper, before employing other measures, to evacuate the stomach by the free use of warm liquids.

A peculiarity of digitalis is, that after having been given in moderate doses for several days, without any apparent effect, it sometimes acts suddenly with an accumulated influence, endangering even the life of the patient. It is, moreover, very permanent in its operation, which, having once commenced, is maintained like that of mercury, for a considerable period, without any fresh accession of the medicine. The practical inferences deducible from these properties of digitalis, are first, that after it has been administered for some time without effect, great caution should be observed not to increase the dose, nor to urge the medicine too vigorously; and secondly, that after its effects have begun to appear, it should be suspended for a time, or exhibited in moderate doses, lest a dangerous accumulation of its influence should be experienced. In numerous instances death has resulted from its incautious employment.

Digitalis has been long known to possess medicinal powers; but it was never generally used, nor regarded as a standard remedy, till after its application by Withering to the treatment of dropsy, about the year 1775. It is at present employed very extensively, both for its diuretic power, and for its sedative influence over the circulation. The former renders it highly useful in dropsical diseases, though like all other remedies it very frequently fails; the latter adapts it to the treatment of cases in which the action of the heart requires to be controlled. The idea was at one period entertained, that it might serve as a substitute for the lancet in inflammatory complaints; and it

* See an account of experiments by Professors Jœrg and others of Leipsic, in the N. Am. Med. and Surg. Journ. vol. ii. p. 235.

is at present much employed for this purpose by the Italian physicians, who practise in accordance with the *contra-stimulant* doctrine; but experience has proved that it is a very frail support in any case in which the symptoms of inflammation are such as to call for the loss of blood. As an adjuvant to the lancet, and in cases in which circumstances forbid the employment of this remedy, it is often very useful. Though it certainly has not the power, at one time ascribed to it by some practitioners, of curing phthisis, it acts beneficially as a palliative in that complaint by repressing the excited movements of the heart. In the same way it proves advantageous in aneurism, hypertrophy of the heart, palpitations from rheumatic or gouty irritation, and in various forms of hemorrhage, after action has been sufficiently reduced by the lancet. It has also been prescribed in mania, epilepsy, pertussis, and spasmodic asthma; and highly respectable testimony can be adduced in favour of its occasional efficacy in these complaints; but any good which may be derived from it is ascribable rather to its influence over the brain and nerves, than to that which it exercises over the circulation. The medicine, externally applied, is said to act speedily and powerfully as a diuretic, and to have been used advantageously in dropsy. For this purpose the fresh leaves bruised, or the tincture may be rubbed over the abdomen and on the inside of the thighs. (*Revue Mèdicale, May* 1834.)

The medicine is most effectually administered in substance. The dose of the powder is one grain, repeated twice or three times a day, and gradually increased till some effect is produced upon the head, stomach, pulse, or kidneys, when it should be omitted or reduced. The infusion and tincture are officinal preparations often resorted to. (See *Infusum Digitalis*, and *Tinctura Digitalis.*) The extract has also been employed; and Orfila found it, whether prepared with water or alcohol, more powerful than the powder; but the virtues of digitalis are too energetic to require concentration; and the preparation is not more certain than the powder. The decoction has also been used, but has nothing to recommend it.

Off. Prep. Infusum Digitalis, *U.S., Lond., Ed., Dub.;* Tinctura Digitalis, *U.S., Lond., Ed., Dub.* W.

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DIOSMA CRENATA. Folia.—BUCHU. *Dub.*

Buchu Leaves.

The plant thus designated in the Dublin Pharmacopœia has been separated by Willdenow from the genus *Diosma*, and arranged with several others in a new genus, entitled *Agathosma*, which is acknowledged by other botanical writers.

AGATHOSMA. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Diosmeæ.

Gen. Ch. *Calyx* five parted. *Petals* ten, unequal, inserted in the calyx. *Nectary* five-lobed, inserted in the calyx. *Loudon's Encyc.*

Agathosma crenatum. Willd. *Hort. Berol.—Diosma crenata.* Thunberg; Willd. *Sp. Plant.* i. 1138. This is a small evergreen shrub, with a stem from one to four or five feet high, the branches of which are scattered or in whorls, and bear petiolate, ovate or lanceolate, crenate, coriaceous leaves, dotted on their under surface. The flowers are white, and stand solitarily in the axils of the leaves. The fruit is a stellate capsule, containing black shining seeds. The plant is a native of the Cape of Good Hope, where, in common with others belonging to the same genus and to the analogous one of Diosma, it is called *buchu* in the language of the Hottentots, by whom the leaves are highly esteemed for their odour, and rubbed in the state of powder upon their greasy bodies.

Properties. The *buchu* leaves of the shops are from three quarters of an inch to an inch long, from three to five lines broad, elliptical, lanceolate or ovate, sometimes slightly pointed, sometimes blunt at the apex, very finely notched and glandular at the edges, smooth and of a green colour on the upper surface, dotted and paler beneath, and of a firm consistence. Their odour is strong, diffusive, and somewhat aromatic; their taste bitterish, and closely analogous to that of mint. These various properties are abundantly sufficient to distinguish them from senna, with which they might be confounded upon a careless inspection. Analyzed by Cadet de Gassicourt, they were found to contain in 1000 parts, 6.65 parts of a light, brownish-yellow volatile oil, 211.7 of gum, 51.7 of extractive, 11 of chlorophylle, and 21.51 of resin. Water and alcohol extract their virtues, which probably depend on the volatile oil and extractive matter. The latter is precipitated by the infusion of galls.

Medical Properties and Uses. Buchu leaves are gently stimulant, with a peculiar tendency to the urinary organs, producing diuresis, and, like all other similar medicines, exciting diaphoresis when circumstances favour this mode of action. The Hottentots at the Cape of Good Hope have long used them in a variety of diseases. From these rude practitioners they were borrowed by the resident English and Dutch physicians, by whose recommendation they have been recently employed to some extent in Great Britain and on the continent of Europe, and have begun to attract attention on this side of the Atlantic. They are chiefly given in complaints of the urinary organs, such as gravel, chronic catarrh of the bladder, morbid irritation of the bladder and urethra, disease of the prostate, and retention or incontinence of urine from a loss of tone in the parts concerned in its evacuation. The remedy has also been recommended in chronic rheumatism and cutaneous affections. From twenty to thirty grains of the powder may be given two or three times a day. The leaves are also used in infusion, in the proportion of an ounce to a pint of boiling water, of which the dose is one or two fluidounces. A tincture has been employed as a stimulant embrocation in local pains.

Off. Prep. Infusum Buchu, *Dub.;* Tinctura Buchu, *Dub.* W.

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DIOSPYROS. *U.S. Secondary.*

Persimmon.

"Diospyros Virginiana. Cortex. *The bark.*" *U. S.*

Diospyros. *Sex. Syst.* Diœcia Octandria.—*Nat. Ord.* Ebenaceæ.

Gen. Ch. Male. *Calyx* four to six-cleft. *Corolla* urceolate, four to six-cleft. *Stamens* eight to sixteen; filaments often producing two anthers. Female. Flower as the male. *Stigmas* four or five. Berry eight to twelve-seeded. *Nuttall.*

Diospyros Virginiana. Willd. *Sp. Plant.* iv. 1107; Michaux, *N. Am. Sylv.* ii. 219. The persimmon is an indigenous tree, rising in the Southern States in favourable situations to the height of sixty feet, with a trunk eighteen or twenty inches in diameter; but seldom attaining more than half this size near its northren limits, and often not higher than fifteen or twenty feet.

The stem is straight, and in the old tree covered with a furrowed blackish bark. The branches are spreading; the leaves ovate; oblong, acuminate, entire, smooth, reticulately veined, alternate, and supported on pubescent footstalks. The buds are smooth. The male and female flowers are on different trees. They are lateral, axillary, solitary, nearly sessile, of a pale orange colour, and not conspicuous. The fruit is a globular berry, of a dark yellow colour externally when perfectly ripe, and containing numerous seeds embedded in a soft yellow pulp.

This tree is very common in the Middle and Southern States; but, according to Michaux, does not flourish beyond the forty-second degree of north latitude. The flowers appear in May or June; but the fruit is not ripe till the middle of autumn. While in the green state, the fruit is excessively astringent; but when perfectly mature, and after having been touched by the frost, it is sweet and palatable. We are told by Michaux, that in the Southern and Western States it is made into cakes with bran, and used for preparing beer with the addition of water, hops, and yeast. A spirituous liquor may be obtained by the distillation of the fermented infusion. The bark is the only part of the tree directed by the Pharmacopœia. It is astringent and very bitter; and is said to have been used advantageously in intermittents, and in the form of a gargle in ulcerated sorethroat. W.

DOLICHOS. *U.S.*

Cowhage.

"Dolichos pruriens. Leguminum pubes. *The bristles of the pods.*" *U. S.*

Off. Syn. DOLICHI PUBES. Dolichos pruriens. Leguminum pubes. *Lond.;* DOLICHI PRURIENTIS PUBES. Ex Legumine. *Ed.;* DOLICHOS PRURIENS. Pubes leguminis. *Dub.*

Pois a gratter, *Fr.;* Kuhkrätze, *Germ.;* Dolico Scottante, *Ital.*

Dolichos. *Sex. Syst.* Diadelphia Decandria.—*Nat. Ord.* Leguminosæ.

Gen. Ch. Base of the *Banner* with two oblong parallel callosities, compressing the wings beneath. *Willd.*

The cowhage plant has been separated by some botanists from the Dolichi. De Candolle has erected the section to which it belongs into a new genus with the title *Mucuna;* and Persoon places it in the genus *Stizolobium.* All the British Pharmacopœias, as well as that of the United States, refer it to Dolichos.

Dolichos pruriens. Willd. *Sp. Plant.* iii. 1041; Woodv. *Med. Bot.* p. 422. t. 153. This is a perennial climbing plant, with an herbaceous branching stem, which twines round the trees in its vicinity, and rises to a considerable height. The leaves are ternate, and stand on long footstalks placed alternately on the stem at the distance of a foot from each other. They are smooth on their upper surface, and hairy beneath. The flowers, which resemble those of the pea in form, are large, of a red or purplish colour, usually placed in threes on short peduncles, and hang from the axils of the leaves in pendent spikes about a foot in length. The fruit is a coriaceous pod, shaped like the Italic letter *ſ*, about four inches long, and covered with brown bristly hairs, which easily separate, and when handled stick in the fingers, producing an intense itching sensation. The plant is a native of the East and West Indies, and other parts of tropical Asia and America. The part usually imported is the pod, of which the hairs are the officinal portion.

Medical Properties and Uses. These spiculæ are said to be possessed of powerful vermifuge properties; and are thought to act mechanically, by penetrating the worms. That they do act in this manner is evinced, as well by the result of direct experiment upon worms out of the body, as by the fact that neither the tincture nor decoction is in the slightest degree anthelmintic. Why the worms should be injured, and the mucous membrane of the stomach and bowels escape with impunity, is not satisfactorily explained. The medicine was first employed as a vermifuge by the inhabitants of the West Indies, and thence passed into British practice. The testimony in its favour is too strong to admit of any reasonable doubt as to its efficiency. It has been chiefly employed against the round worm; but all the different species which infest the alimentary canal have been expelled by its use. It is best administered mixed with some tenacious vehicle. The usual mode of preparing it is to dip the pods into syrup or molasses, and scrape off the hairs with the liquid, which is in a proper state for administration when it has attained the consistence of thick honey. The dose of this preparation is a tablespoonful for an adult, a teaspoonful for a child three or four years old, to be given every morning for three days, and then followed by a brisk cathartic.

The root of the D. pruriens is said by Ainslie to be employed in the East Indies in the treatment of cholera; and both this part and the pods have been thought to possess diuretic properties. W.

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DRACONTIUM. *U.S. Secondary.*

Skunk Cabbage.

"Dracontium fœtidum, *Willd.* Ictodes fœtidus, *Bigelow.* Symplocarpus fœtidus, *Barton.* Radix. *The Root.*" *U. S.*

Botanists have had some difficulty in properly arranging this plant. It is attached by Willdenow to the genus *Dracontium*, by Michaux and Pursh is considered a *Pothos*, and by American botanists has been erected into a new genus, which Nuttall calls *Symplocarpus* after Salisbury, and for which Dr. Bigelow has proposed the name *Ictodes*, expressive of the odour of the plant. The term *Symplocarpus*, though erroneous in its origin, was first proposed for the new genus, and, having been adopted by several botanists, should be retained.

SYMPLOCARPUS. *Sex. Syst.* Tetrandria Monogynia.—*Nat. Ord.* Adroideæ.

Gen. Ch. *Spathe* hooded. *Spadix* covered with perfect flowers. *Calyx* with four segments. *Petals* none. *Style* pyramidal. *Seeds* immersed in the spadix. *Bigelow.*

Symplocarpus fœtidus. Barton, *Med. Bot.* i.123.—*Ictodes fœtidus.* Bigelow, *Am. Med. Bot.* ii. 41. The *skunk cabbage* is a very curious plant, the only one of the genus to which it belongs. The root is perennial, large, abrupt, and furnished with numerous fleshy fibres, which penetrate to the depth of two feet or more. The spathe, which appears before the leaves, is ovate, acuminate, obliquely depressed at the apex, auriculated at the base, folded inwards at the edges, and of a brownish-purple colour, varied with spots of red, yellow, and green. Within the spathe, the flowers, which resemble it in colour, are placed in great numbers upon a globose, peduncled spadix, for which they form a compact covering. After the spathe has decayed, the spadix continues to grow, and when the fruit is mature, has attained a size exceeding by several fold its original dimensions. The different parts of the flower, with the exception of the anthers, augment in like proportion. At the base of each style is a roundish seed, immersed in the spadix, about the size of a pea, and speckled with purple and yellow. The leaves, which rise from the ground after the flowers, are numerous and crowded, oblong, cordate, acute, smooth, strongly veined, and attached to the root by long petioles, which are hollowed in front, and furnished with coloured sheathing stipules. At the beginning of May, when the leaves are fully developed, they are very large, being from one to two feet in length, and from nine inches to a foot in breadth.

This plant is indigenous, growing abundantly in meadows, swamps, and other wet places, throughout the whole northern and middle sections of the Union. Its flowers appear in March and April, and in the lower latitudes often so early as February. The fruit is usually quite ripe, and the leaves decayed before the end of August. The plant is very conspicuous from its abundance, and from the magnitude of its leaves. All parts of it have a disagreeable fetid odour, thought to resemble that of the offensive animal after which it is named. This odour resides in an extremely volatile principle, which is rapidly dissipated by heat, and diminished by desiccation. The root is the part usually employed in medicine. It should be collected in autumn, or early in spring, and dried with care.

The dried root, as found in the shops, consists of two distinct portions; the body or caudex, either whole or in transverse slices, and the separated radicles. The former, when whole, is cylindrical, or in the shape of a truncated cone, two or three inches long by about an inch in thickness, externally dark brown and very rough from the insertion of the radicles, internally white and amylaceous. The latter are in pieces of various lengths, about as thick as a hen's quill, very much flattened and wrinkled, white within, and covered by a yellowish reddish-brown epidermis, of a considerably lighter shade than that of the body of the root. The fetid odour remains, to a greater or less extent, for a considerable period after the completion of the drying process. The taste, though less decided than in the fresh state, is still acrid, manifesting itself after the root has been chewed for a short time, by a prickling and smarting sensation in the mouth and throat. The acrimony, however, is dissipated by heat, and is entirely lost in decoction. It is also diminished by time and exposure; and the root should not be kept for use longer than a single season.

Medical Properties and Uses. The properties of this root are those of a stimulant, antispasmodic, and narcotic. In large doses it occasions nausea and vomiting, with headach, vertigo, and dimness of vision. Dr. Bigelow has witnessed these effects from thirty grains of the recently dried root. The medicine was introduced into notice by the Rev. Dr. Cutler, who recommended it highly as an antispasmodic in asthma, and it has been subsequently employed with apparent advantage in chronic catarrh, chronic rheumatism, and hysteria. Cures are also said to have been effected by its use in dropsy.

It is best given in powder, of which the dose is from ten to twenty grains, to be repeated three or four times a day, and gradually increased till some evidence of its action is afforded. A strong infusion is sometimes employed, and the people in the country prepare a syrup from the fresh root; but the latter preparation is very unequal. The root itself, as kept in the shops, is of uncertain strength, in consequence of its deterioration by age. W.

DULCAMARA. *U.S.*

Bittersweet.

"Solanum dulcamara. Caulis. *The stalk.*" *U.S.*

Off. Syn. DULCAMARÆ CAULIS. Solanum Dulcamara. Caulis. *Lond.;* SOLANI DULCAMARÆ CAULES, *Ed.;* DULCAMARA. SOLANUM DULCAMARA. Caules. *Dub.*

Douce-amère, *Fr.:* Bittersüss, Alpranken, *Germ.;* Dulcamara, *Ital., Span.*

SOLANUM. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Solaneæ.

Gen. Ch. *Corolla* wheel-shaped. *Anthers* somewhat coalescing, opening by two pores at the apex. *Berry* two-celled. *Willd.*

This genus includes numerous species, of which several have been used in medicine. Besides the *S. Dulcamara*, which is the only officinal species, two others merit a brief notice. 1. The *Solanum nigrum*, the *common garden*, or *black nightshade*, is an annual plant from one to two feet high, with an unarmed herbaceous stem, ovate, angular-dentate leaves, and white or pale violet flowers, arranged in peduncled nodding umbel-like racemes, and followed by clusters of spherical black berries, about the size of peas. There are numerous varieties of this species, one of which is a native of the United States. The leaves are the part employed in medicine. They are said to produce diaphoresis, sometimes diuresis and moderate purging, and in large doses nausea and giddiness. As a medicine they have been used in cancerous, scrofulous, and scorbutic diseases, and other painful ulcerous affections, being given internally, and applied at the same time in the form of poultice, ointment, or decoction to the tumours or ulcers themselves. A grain of the dried leaves may be given every night and gradually increased to ten or twelve grains, or till some sensible effect is experienced. The medicine, however, is scarcely used at present. By some persons the poisonous properties usually ascribed to the common nightshade are doubted. M. Dunal of Montpelier states as the result of numerous experiments, that the berries are not poisonous to man or the inferior animals; and the leaves are said to be consumed in large quantities in the Isles of France and Bourbon as food, having been previously boiled in water. In the latter case, the active principle of the plant must have been extracted by decoction. 2. The *Solanum tuberosum* or *common potato* is interesting on account of the nutritive properties of its tubers, so extensively employed as food. The leaves, stalks, and unripe berries are asserted to have narcotic properties, and an extract prepared from the leaves has been employed as a remedy in cough and spasmodic affections, in which it is said to act like opium. (*Geiger.*) From half a grain to two grains may be given as a dose. Dr. Latham of London found the extract to produce very favourable effects in various chronic complaints, such as protracted cough, chronic rheumatism, angina pectoris, cancer of the uterus, &c. The influence which it exercised upon the nervous system was strongly marked, and, in many instances, the dose could not be increased above a few grains without giving rise to threatening symptoms. It appeared to Dr. Latham to be very analogous in its operation to digitalis. His experiments were repeated in Philadelphia by Dr. Worsham with very different results. The extract was found in the quantity of nearly one hundred grains to produce no sensible effect on the system. (*Philad. Journ. of Med. and Phys. Sciences*, vi. 22.) We can reconcile these opposite statements only upon the supposition that the properties of the plant vary with the season, or with the place and circumstances of culture. An excellent form of starch, called potato arrow-root, is prepared from potatoes for medical use; and an imitation of sago is also made from them in Germany. Dr. Julius Otto found *solania* in the germs of the potato. He was induced to make the investigation by observing, that cattle were destroyed by feeding on the residue of germinated potatoes, used for the manufacture of brandy. (See *Journ. of Phil. Col. of Pharm.* vi. 348.)

Solanum Dulcamara. Willd. *Sp. Plant.* i. 1028; Woodv. *Med. Bot.* p. 237. t. 84; Bigelow, *Am. Med. Bot.* i. 169. The *bittersweet* or *woody nightshade* is a climbing shrub, with a slender, roundish, branching, woody stem, which, in favourable situations, rises six or eight feet in height. The leaves are alternate, petiolate, ovate, pointed, veined, soft, smooth, and of a dull green colour. Many near the top of the stem are furnished with lateral projections at their base, giving them a hastate form. Most of them are quite entire, some cordate at the base. The flowers are disposed in elegant clusters, somewhat analogous to cymes, and standing opposite to the leaves. The calyx is very small, purplish, and divided into five blunt persistent segments. The corolla is wheel-shaped, with five pointed reflected segments, which are of a voilet-blue colour, with a darker purple vein running longitudinally through their centre, and two shining greenish spots at the base of each. The filaments are very short, and support large erect lemon-yellow anthers, which cohere in the form of a cone around the style. The berries are of an oval shape and a bright scarlet colour, and continue to hang in beautiful bunches after the leaves have fallen.

This plant is common to Europe and North America. It flourishes most luxuriantly in damp and sheltered places, as on the banks of rivulets, and among the thickets which border our natural meadows. It is also found in higher and more exposed situations, and is frequently cultivated in gardens. In the United States it extends from New England to Ohio, and is in bloom from June to August. The root and stalk are possessed of the medicinal properties of the plant, though the latter only is officinal. The berries, which were formerly esteemed poisonous, and thought to act with great severity on the stomach and bowels, are now said to be innoxious. Bittersweet should be gathered in autumn, after the fall of the leaf; and the extreme twigs should be selected. That grown in high and dry situations is said to be the best.

The dried twigs, as brought to the shops, are of various lengths, cylindrical, about as thick as a goose-quill, externally wrinkled and of a grayish-ash colour, consisting of a thin bark, an interior ligneous portion, and a central pith. They are inodorous, though the stalk in the recent state emits, when bruised, a peculiar, rather nauseous smell. Their taste, which is at first bitter, and afterwards sweetish, has given origin to the name of the plant. Boiling water extracts all their virtues. These are supposed to depend, at least in part, upon a peculiar alkaline principle called *solanin* or *solania*, which was originally discovered by M. Desfosses of Besançon in the berries of the *Solanum nigrum*, and has subsequently been found in the stalks, leaves, and berries of the *S. Dulcamara* and *S. tuberosum*. It is supposed to exist in the bittersweet combined with malic acid. It is obtained by precipitating the decoction of bittersweet with ammonia or magnesia, washing the precipitate with cold water, and then treating it with boiling alcohol, which deposites the alkaline principle on cooling, and still further by evaporation. Solania is in the form of a white opaque powder, inodorous, of a bitter taste, fusible at a little above 212°, scarcely soluble in water, soluble in alcohol and ether, and capable of neutralizing the acids. Given to a cat it was found by M. Desfosses to operate at first as an emetic, and afterwards as a narcotic. Dr. J. Otto observed, among its most striking effects, a paralytic condition of the posterior limbs of the animals to which it was administered. One grain of the sulphate of solania was sufficient in his hands to destroy a rabbit in six hours. Besides solania, the stalks of the S. Dulcamara contain, according to Pfaff, a peculiar principle to which he has given the name of *picroglycion*, indicative of the taste at once bitter and sweet which it is said to possess. This has been obtained in a crystalline state by Biltz, by the following process. The watery extract is treated with alcohol, the tincture evaporated, the residue dissolved in water, the solution precipitated with subacetate of lead, the excess of this salt decomposed by sulphuretted hydrogen, the liquor then evaporated to dryness, and the residue treated with acetic ether, which yields the principle in the form of small isolated crystals by spontaneous evaporation.

Medical Properties and Uses. Dulcamara possesses narcotic properties, with the power of increasing the secretions, particularly that of the kidneys and skin. Its narcotic effects do not become obvious, unless when it is taken in large quantities. In overdoses it produces nausea, vomiting, faintness, vertigo, and convulsive muscular movements. It has been recommended in various diseases, but is now nearly confined to the treatment of cutaneous eruptions, particularly those of a scaly character, as lepra, psoriasis, and ptyriasis. In these complaints it is often decidedly beneficial, especially in combination with minute doses of the antimonials. Its influence upon the secretions is insufficient to account for its favourable effects, and we must be content with ascribing them to an alterative action. It is said to have been beneficially employed in chronic rheumatism. Antaphrodisiac properties are ascribed to it by some physicians. (See *Am. Cyc.* of *Pract. Med.* ii. 23.) The usual form of administration is that of decoction, of which two fluidounces may be taken four times a day, and gradually increased till some slight disorder of the head indicates the activity of the medicine. (See *Decoctum Dulcamaræ.*) An extract may also be prepared, of which the dose is from five to ten grains. That of the powder would be from thirty grains to a drachm.

In cutaneous affections a strong decoction is often applied to the skin, at the same time that the medicine is taken internally.

Off. Prep. Decoctum Dulcamaræ, *U.S.*, *Lond.* W.

ELATERIUM. *U.S.*

Elaterium.

"Momordica elaterium. Materia fructûs succo demissa. *The substance deposited by the juice of the fruit.*" *U.S.*

Off. Syn. ELATERII PEPONES. Momordica Elaterium. Pepones recentes.—EXTRACTUM ELATERII. *Lond.;* ELATERIUM. Ex Momordicâ Elaterio. *Ed.;* MOMORDICA ELATERIUM. Fructus. Fæcula. Folia.—ELATERIUM.—EXTRACTUM ELATERII. *Dub.*

Elaterion, *Fr.;* Elaterium, *Germ.;* Elaterio, *Ital.*, *Span.*

MOMORDICA. *Sex. Syst.* Monœcia Monadelphia.—*Nat. Ord.* Cucurbitaceæ.

Gen. Ch. MALE. *Calyx* five-cleft. *Corolla* five-parted. *Filaments* three. FEMALE. *Calyx* five-cleft. *Corolla* five-parted. *Style* trifid. *Gourd* bursting elastically. *Willd.*

Momordica Elaterium. Willd. *Sp. Plant.* iv. 605; Woodv. *Med. Bot.* p. 192. t. 72. The *wild* or *squirting cucumber* is a perennial plant, with a large fleshy root, from which proceed several round, thick, rough stems, branching and trailing like the common cucumber, but without tendrils. The leaves are petiolate, large, rough, irregularly cordate, and of a grayish-green colour. The flowers are yellow, and proceed from the axils of the leaves. The fruit has the shape of a small oval cucumber, about an inch and a half long, an inch thick, of a greenish or grayish colour, and covered with stiff hairs or prickles. When fully ripe, it separates from the peduncle, and throws out its juice and seed with considerable force through an opening at the base, where it was attached to the footstalk. The name of squirting cucumber was derived from this circumstance, and the scientific and officinal title is supposed to have had a similar origin, though some authors maintain that the term *elaterium* was applied to the medicine, rather from the mode of its operation upon the bowels, than from the projectile property of the fruit.*

This species of Momordica is a native of the South of Europe; and is cultivated in Great Britain, where, however, it perishes in the winter. Elaterium is the substance spontaneously deposited by the juice of the fruit, when separated, and allowed to stand. Dr. Clutterbuck of London has proved that it is contained only in the free juice which surrounds the seeds, and which is obtained without expression. The body of the fruit itself, the seeds, as well as other parts of the plant, are nearly or quite inert. When the fruit is sliced and placed upon a sieve, a perfectly limpid and colourless juice flows out, which after a short time becomes turbid, and in the course of a few hours begins to deposite a sediment. This, when collected and carefully dried, is very light and pulverulent, of a yellowish-white colour, slightly tinged with green. It is the genuine elaterium, and was found by Clutterbuck to purge violently in the dose of one-eighth of a grain. But the quantity contained in the fruit is exceedingly small. Clutterbuck obtained only six grains from forty cucumbers. Commercial elaterium is a much weaker medicine, owing in part, perhaps, to adulteration, but much more to the mode in which it is prepared. In order to increase the product, the juice of the fruit is often expressed; and there is reason to believe that it is sometimes evaporated so as to form an extract, instead of being allowed to deposite the active matter. The French elaterium is prepared by expressing the juice, clarifying it by rest and filtration, and then evaporating it to a suitable consistence. As the liquid which remains after the deposition of the sediment is comparatively inert, it will be readily perceived that the preparation of the French Codex must be very feeble. The following are the directions of the London College, with which those of the Dublin College essentially correspond. "Slice ripe wild cucumbers, express the juice very gently, and pass it through a very fine hair sieve into a glass vessel; then set it aside for some hours until the thicker part has subsided. Reject the thinner, supernatant part, and dry the thicker part with a gentle heat." The product thus obtained is less pure than the elaterium of Clutterbuck; but is probably the preparation usually imported from England. It is incorrectly denominated by the London and Dublin Colleges *Extractum Elaterii*, as it is neither an extract, strictly speaking, nor an inspissated juice. In the Pharmacopœias of the United States and Edinburgh, it is named simply *Elaterium.*

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* From the Greek ελαυνω I drive, or ελατηϱ driver. The word elaterium was used by Hippocrates to signify any active purge. Dioscorides applied it to the medicine of which we are treating.

As the plant is not cultivated in this country for medicinal purposes, our Pharmacopœia very properly adopts as officinal, the medicine as it is found in commerce.

Properties. The elaterium of the shops is in thin flat cakes or fragments, often bearing the impression of the muslin upon which it was dried, of a greenish-gray colour, and a bitter, somewhat acrid taste. When good, it is light, pulverulent, and inflammable. As it is exceedingly variable in strength, in consequence either of adulteration or improper preparation, it is an object of some importance to ascertain in what principle its virtues reside, and to discover a mode of isolating that principle. Dr. Paris found that the alcoholic extract, treated with boiling distilled water, and afterwards dried, had the property of purging in very minute doses, while the remaining portion of the elaterium was inactive. Supposing this substance to be the active ingredient, he gave it the name of *elatin;* but from the very minute quantity of elaterium upon which he operated, his results are by no means satisfactory. The more recent experiments of Mr. Hennel of London and Mr. Morries of Edinburgh, have demonstrated the existence of a crystallizable matter in elaterium, which will probably be found to be the purgative principle; and the elatin of Dr. Paris, to be a mixture of this substance and chlorophylle, or the green colouring matter of vegetables.* Mr. Morries has proposed for the newly discovered principle the appropriate name of *elaterin.* From the analysis of Mr. Hennel, it appears that 100 parts of elaterium contain 44 of the crystallizable substance (elaterin), 17 of a green resin, 6 of starch, 27 of woody fibre, and 6 of saline matters. But the analysis cannot be considered as complete.†

Elaterin, according to Mr. Morries, crystallizes when pure in colourless microscopic rhombic prisms, which have a silky appearance when in mass. It is extremely bitter and rather styptic to the taste, insoluble in water and alkaline solutions, soluble in alcohol, ether, and hot olive oil, and sparingly soluble in dilute acids. At a temperature between 300° and 400° it melts, and at a higher temperature is dissipated in thick, whitish, pungent vapour, having an ammoniacal odour. It has no alkaline reaction. Mr. Morries procures it by evaporating an alcoholic tincture of elaterium to the consistence of thin oil, and throwing the residue while yet warm into boiling distilled water. A copious white precipitate immediately forms, and increases as the liquor cools. This, when separated and well washed with distilled water, is the elaterin sufficiently pure for medical use. It may be rendered quite pure by dissolving in alcohol, evaporating, and precipitating as before. Mr. Hennel obtained it by treating with ether the alcoholic extract procured by the spontaneous evaporation of the tincture. This consists of elaterin and the green resin, the latter of which being much more soluble in ether than the former, is completely extracted by this fluid, leaving the elaterin pure. But as elaterin is also slightly soluble in ether, a portion of this principle is wasted by Mr. Hennel's method. By evaporating the ethereal solution, the green resin is obtained in a separate state. Mr. Hennel states that this was found to possess the purgative property of the elaterium in a concentrated state, as it acted powerfully in a dose less than one-third of a grain. But this effect was probably owing to the presence of a portion of elaterin which had been dissolved by the ether. The late Dr. Duncan of Edinburgh ascertained that the crystalline principle or elaterin, which was not tried by Mr. Hennel, produced, in the quantity of $\frac{1}{12}$th or $\frac{1}{16}$th of a grain, all the effects of a dose of elaterium. The quantity of elaterin varies exceedingly in different parcels of the drug. Mr. Morries obtained 26 per cent. from the best British elaterium, 15 per cent. from the worst, and only 5 or 6 per cent. from the French; while a portion procured according to the directions of the London College, yielded to Mr. Hennel upwards of 40 per cent. This great diversity in the strength of the elaterium renders the substitution of its purgative principle highly desirable.

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* The substance to which Pelletier gave the name of *chlorophylle*, under the impression that it was a peculiar proximate principle, has been ascertained by that chemist to be a mixture of wax, and a green fixed oil. *Journ. de Pharm.* xix. 109.

† See a paper by Mr. Henry Hennel in the Journal of the Royal Institution of Great Britain, May 1831; also a paper by Mr. John D. Morries in the Ed. Med. and Surg. Journ. April 1831.

Medical Properties and Uses. Elaterium is a powerful hydragogue cathartic, and in the full dose generally excites nausea and vomiting. If too freely administered, it operates with great violence both upon the stomach and bowels, producing inflammation of these organs, which has in some instances eventuated fatally. It also increases the flow of urine. The fruit was employed by the ancients, and is recommended in the writings of Dioscorides as a remedy in mania and melancholy. Sydenham and his cotemporaries considered elaterium highly useful in dropsy; but, in consequence of some fatal results from its incautious employment, it fell into disrepute, and was generally neglected, till again brought into notice by Dr. Ferriar. It is now considered one of the most efficient hydragogue cathartics in the treatment of dropsical diseases, in which it has sometimes proved successful after all other remedies have failed. The full dose of the commercial elaterium is from one to two grains; but as in this quantity it generally vomits, if of ordinary strength, the best mode of administering it is in the dose of half a grain repeated every hour till it operates. The dose of Clutterbuck's elaterium is $\frac{1}{8}$th of a grain. That of elaterin is from $\frac{1}{16}$th to $\frac{1}{12}$th of a grain, and is best given in solution. One grain may be dissolved in a fluidounce of alcohol with four drops of nitric acid, and from 30 to 40 minims may be given diluted with water. W.

ELEMI. *Lond., Dub.*

Elemi.

"Amyris elemifera. *Resina.*" *Lond., Dub.*

Résine élémi, *Fr.;* Oelbaumharz, Elemi, *Germ.;* Elemi, *Ital.;* Goma de limon, *Span.*

AMYRIS. *Sex. Syst.* Octandria Monogynia.—*Nat. Ord.* Terebintaceæ, *Juss.;* Amyrideæ, *R. Brown, Lindley.*

Gen. Ch. Calyx four-toothed. *Petals* four, oblong. *Stigma* four-cornered. *Berry* drupaceous. *Willd.*

Some botanists separate from this genus the species which have their fruit in the form of a capsule instead of a nut, and associate them together in a distinct genus with the name of *Icica.* This is recognised by De Candolle.

Most of the trees belonging to these two genera yield, when wounded, a resinous juice analogous to the turpentines, and differing little as procured from the different species. It is not improbable that the drug usually known by the name of *elemi*, though referred by the Colleges to one tree, is in fact derived from several. That known to the ancients is said to have been obtained from Ethiopia, and all the elemi of commerce was originally brought from the Levant. The tree which afforded it was not accurately known, but was supposed to be a species of Amyris. Geiger states, that it was derived from the A. Zeilanica, growing in Ceylon. At present the drug is taken to Europe from Brazil, and is believed to be the product of a plant mentioned by Marcgrav under the name of *icicariba*, and considered by Linnæus as the *Amyris elemifera*. It appears, however, to be properly an *Icica*, and De Candolle denominates it *I. Icicariba*. We can find no detailed description of the tree. It has a lofty trunk, with pinnate leaves, consisting of three or five pointed, perforated leaflets, which are smooth on their upper surface, and woolly beneath. It is erroneously stated in some works to be a native of Carolina. The elemi is obtained by incisions into the tree, through which the juice flows and concretes upon the bark.

It is in masses of various consistence, sometimes solid and heavy, like wax, sometimes light and porous; unctuous to the touch; diaphanous; of diversified colours, generally greenish with intermingled points of white or yellow, sometimes greenish-white with brown stains, sometimes yellow like sulphur; fragile and friable when cold; softening by the heat of the hand; of a terebinthinate somewhat aromatic odour, diminishing with age, and said, in some varieties, to resemble that of fennel; of a warm, slightly bitter, disagreeable taste; entirely soluble, with the exception of impurities, in boiling alcohol; and affording a volatile oil by distillation. It consists, according to M. Bonastre, of 60 parts of resin, 24 of a resinous matter soluble in boiling alcohol, but deposited when the liquid cools, 12.5 of volatile oil, 2 of extractive, and 1.5 of acid and impurities. It is sometimes adulterated with colophony and turpentine.

Medical Properties and Uses. Elemi has properties analogous to those of the turpentines; but is exclusively applied to external use. In the United States it is rarely employed even in this way. In the pharmacy of Europe it enters into the composition of numerous plasters and ointments. We are told that it is occasionally brought to this country in small fragments mixed with the coarser kinds of gum Arabic from the Levant and India.

Off. Prep. Unguent. Elemi, *Dub.;* Unguent. Elemi Comp., *Lond.*

W.

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ERIGERON CANADENSE. *U.S. Secondary.*

Canada Fleabane.

"Erigeron Canadense. Planta. *The plant.*" *U.S.*

ERIGERON. *Sex. Syst.* Syngenesia Superflua.—*Nat. Ord.* Compositæ Corymbiferæ.

Gen. Ch. Calyx imbricated, sub-hemispherical, in fruit often reflected. *Florets of the ray* linear, very narrow, numerous. *Receptacle* naked. *Pappus* double, exterior minute, interior pilose, of few rays. *Nuttall.*

Erigeron Canadense. Willd. *Sp. Plant.* iii. 1954. This is an indigenous annual plant, with a stem from two to six feet high, covered with stiff hairs, and divided into numerous branches. The leaves are linear lanceolate, and edged with hairs; those at the root are dentate. The flowers are very small, numerous, white, and arranged in terminal panicles. They differ from those of the other species of Erigeron in having an oblong calyx, the rays very minute and more numerous than the florets of the disk, and the seed-down simple. Hence by some botanists the plant is placed in a sub-genus with the title *Cænotus*. Another variety of the *E. Canadense*, which Mr. Nuttall makes a distinct species, with the title *E. pusilum*, is not more than from four to six inches high, and has an erect smooth stem, less branched than the preceding, with all its leaves entire, and scabrous on the margin. The panicle is simple, and the peduncles filiform, nearly naked, divaricate, each bearing two or three flowers.

The Canada fleabane is very common throughout the northern and middle sections of the United States, and has become naturalized in many parts of Europe. It abounds in neglected fields, and blooms in July and August. The plant, all parts of which are medicinal, should be collected while in flower. The leaves and flowers are said to possess its peculiar virtues in greatest perfection.

This species of Erigeron has an agreeable odour, and a bitterish, acrid, somewhat astringent taste. Among its constituents, according to Dr. De Puy, are bitter extractive, tannin, gallic acid, and volatile oil. Both alcohol and water extract its virtues. Its acrimony is diminished by decoction, probably in consequence of the escape of the oil.

Medical Properties and Uses. From the observations of Dr. De Puy, it appears to be diuretic, tonic, and astringent; and has been found useful in dropsical complaints and diarrhœa. It may be given in substance, infusion, tincture, or extract. The dose of the powder is from thirty grains to a drachm; of an infusion prepared in the proportion of an ounce of the plant to a pint of boiling water, from two to four fluidounces; of the aqueous extract from five to ten grains. In each case the dose should be repeated every two or three hours. W.

ERIGERON HETEROPHYLLUM. *U.S. Secondary.*

Various-leaved Fleabane.

"Erigeron heterophyllum. Planta. *The Plant.*" *U.S.*

ERIGERON PHILADELPHICUM. *U.S. Secondary.*

Philadelphia Fleabane.

"Erigeron Philadelphicum. Planta. *The Plant.*" *U.S.*

Erigeron. See ERIGERON CANADENSE.

1. *Erigeron heterophyllum.* Willd. *Sp. Plant.* iii. 1956; Barton, *Am. Med. Bot.* i. 231. This is a biennial herbaceous plant, belonging both to North America and Europe. It has a branching root, from which proceed several erect, roundish, striated, pubescent stems, much divided near the top, and rising two or three feet in height. The lower leaves are ovate, acute, deeply toothed, and supported upon long winged footstalks; the upper are lanceolate, acute, deeply serrate in the middle, and sessile; the floral leaves are lanceolate and entire; all, except those from the root, are ciliate at the base. The flowers are in terminal corymbs. The florets of the disk are yellow, those of the ray numerous, very slender, and of a white, pale blue, or pale purple colour. The flowering period is from June to October.

Erigeron Philadelphicum. Willd. *Sp. Plant.* iii. 1957; Barton, *Med. Bot.* i. 227. The Philadelphia fleabane is perennial and herbaceous, with a branching yellowish root, and from one to five erect stems, which rise two or three feet in height, and are much branched at top. The whole plant is pubescent. The lower leaves are ovate lanceolate, nearly obtuse, ciliate on the margin, entire or marked with a few serratures, and supported on very long footstalks; the upper are narrow, oblong, somewhat wedge-shaped, obtuse, entire, sessile, and slightly embrace the stem; the floral leaves are small and lanceolate. The flowers are numerous, radiate, and disposed in a panicled corymb, with long peduncles bearing from one to three flowers. They resemble those of the preceding species in colour, and make their appearance at about the same period.

We include these two species under one head, because they grow together, possess identical medical properties, and are indiscriminately employed. They are found in various parts of the United States, and abound in the fields about Philadelphia, where they are known and used under the common though inaccurate name of *scabious*. The whole herb is used, and should be collected while the plants are in flower. It has an aromatic odour, and a slightly bitterish taste; and imparts its properties to boiling water.

Medical Properties and Uses. Fleabane is diuretic, without being offensive to the stomach. It is a favourite remedy with some highly respectable practitioners of Philadelphia in gravel and other nephritic diseases, and has been employed with advantage in dropsy. By the late Dr. Wistar it was recommended in hydrothorax complicated with gout. When the obstinate character and long continuance of certain dropsical affections are considered, the advantage must appear obvious, of having numerous remedies calculated to mitigate the symptoms without exhausting the strength of the patient; so that when one has lost its power from repetition, we may appeal to another with some prospect of benefit. On this account it is, that fleabane is worthy the notice of the profession. It cannot be relied on for the cure of dropsy.

It is most conveniently administered in infusion or decoction, of which a pint, containing the virtues of an ounce of the herb, may be given in twenty-four hours.

W.

* * *

ERYNGIUM. *U.S. Secondary.*

Button Snakeroot.

"Eryngium aquaticum. Radix. *The root.*" *U.S.*

Eryngium. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferæ.

Gen. Ch. Flowers capitate. *Involucrum* many-leaved. Proper *Calyx* five-parted, superior, persistent. *Corolla* of five petals. *Receptacle* foliaceous, segments acute or cuspidate. *Fruit* bipartile. *Nuttall.*

Eryngium aquaticum. Willd. *Sp. Plant.* i. 1357. The *button snakeroot* or *water eryngo* is an indigenous herbaceous plant, with a perennial tuberous root, and a stem two or three feet high, sometimes, according to Pursh, six feet, generally branching by forks, but trichotomous above. The leaves are very long, linear-lanceolate on the upper part of the stem, sword-shaped below, with bristly spines at distant intervals upon their margin. The floral leaves are lanceolate and dentate. The flowers are white or pale, and disposed in globose heads, with the leaflets of the involucrum shorter than the head, and, like the scales of the receptacle, entire. This plant is found in low wet places, from Virginia to Carolina. Its period of flowering is August.

The root, which is the medicinal portion, has a bitter, pungent, aromatic taste, provoking, when chewed, a flow of saliva. It is diaphoretic, expectorant, in large doses occasionally emetic; and is used by some physicians in decoction as a substitute for seneka. (*Bigelow.*) We are told in Barton's "Collections," that it is nearly allied to the contrayerva of the shops. W.

ERYTHRONIUM. *U.S. Secondary.*

Erythronium.

"Erythronium Americanum. Planta. *The Plant.*" *U.S.*

ERYTHRONIUM. *Sex. Syst.* Hexandria Monogynia.—*Nat. Ord.* Liliaceæ.

Gen. Ch. Calyx none. *Corolla* inferior, six-petalled; the three inner petals with a callous prominence on each edge near the base. *Bigelow.*

Erythronium Americanum. Muhl. *Catalogue* 84; Bigelow, *Am. Med. Bot.* iii. 151.—*E. lanceolatum.* Pursh, p. 230. This is an indigenous perennial bulbous plant, sometimes called, after the European species, *dog's tooth violet.* The bulb, which is brown externally, white and solid within, sends up a single naked slender flower-stem, and two smooth lanceolate nearly equal leaves, sheathing at their base, with an obtuse callous point, and of a brownish-green colour diversified by numerous irregular spots. The flower is solitary, nodding, yellow, with oblong lanceolate petals obtuse at the point, a club-shaped undivided style, and a three-lobed stigma.

The Erythronium grows in woods and other shady places throughout the Northern and Middle States. It flowers in the latter part of April or early in May. All parts of it are active.

In the dose of twenty or thirty grains, the recent bulb acts as an emetic. The leaves are said to be more powerful. The activity of the plant is diminished by drying. So far as we are at present acquainted with its virtues, it may be considered a useless addition to the Materia Medica. Having, however, been adopted in the original edition of the Pharmacopœia, it was deemed best, upon the revision of that work, not to expunge it from the catalogue till it had undergone a longer period of trial. W.

EUPATORIUM PERFOLIATUM. *U.S.*

Thoroughwort.

"Eupatorium perfoliatum. Herba. *The herb.*" *U. S.*

EUPATORIUM. *Sex. Syst.* Syngenesia Æqualis.—*Nat. Ord.* Compositæ Corymbiferæ.

Gen. Ch. Calyx simple or imbricate, oblong. *Style* long, and semi-bifid. *Receptacle* naked. *Pappus* pilose, or more commonly scabrous. *Seed* smooth and glandular, quinquestriate. *Nuttall.*

Of this numerous genus, comprising not less than thirty species within the limits of the United States, most of which probably possess analogous medical properties, three have found a place in the Pharmacopœia of the United States—the *E. perfoliatum*, *E. teucrifolium*, and *E. purpureum*—the first in the primary, the last two in the secondary list. The *E. cannabinum* of Europe, the root of which was formerly used as a purgative; and the *E. Aya-pana* of Brazil, the leaves of which at one time enjoyed a very high reputation as a remedy in numerous diseases, have fallen into entire neglect. The *Aya-pana* is an aromatic bitter, with the medical properties of the *E. perfoliatum* in an inferior degree.

Eupatorium perfoliatum. Willd. *Sp. Plant.* iii. 1761; Bigelow, *Am. Med. Bot.* i. 33; Barton, *Med. Bot.* ii. 125. The *thoroughwort*, or, as it is perhaps more frequently called, *boneset*, is an indigenous perennial plant, with numerous herbaceous stems, which are erect, round, hairy, from two to five feet high, simple below, and trichotomously branched near the summit. The character of the leaves is peculiar, and serves to distinguish the species at the first glance. They may be considered either as perforated by the stem, *perfoliate*, or as consisting each of two leaves joined at the base, *connate.* Considered in the latter point of view, they are opposite and in pairs, which decussate each other at regular distances upon the stem; in other words, the direction of each pair is at right angles with that of the pair immediately above or beneath it. They are narrow in proportion to their length, broadest at the base where they coalesce, gradually tapering to a point, serrate, much wrinkled, paler on the under than the upper surface, and beset with whitish hairs which give them a grayish-green colour. The uppermost pairs are sessile, not joined at the base. The flowers are white, numerous, supported on hairy peduncles, in dense corymbs, which form a flattened summit to the plant. The calyx, which is cylindrical and composed of imbricated, lanceolate, hairy scales, encloses from twelve to fifteen tubular florets, having their border divided into five spreading segments. The anthers are five in number, black, and united into a tube, through which the bifid filiform style projects above the flower.

This species of Eupatorium inhabits meadows, the banks of streams, and other moist places, growing generally in bunches, and abounding in almost all parts of the United States. It flowers from the middle of summer to the latter end of October. All parts of it are active; but the herb only is officinal.

It has a faint odour, and a strongly bitter somewhat peculiar taste. The bitterness and probably the medical virtues of the plant reside in an extractive matter, which is readily taken up by water or alcohol. No accurate analysis of thoroughwort has been made since the recent improvements in vegetable chemistry,

Medical Properties and Uses. Thoroughwort is tonic, diaphoretic, and in large doses emetic and aperient. It is said to have been employed by the Indians in intermittent fever, and has proved successful in the cure of the same complaint in the hands of several regular practitioners. The general experience, however, is not in its favour. We have seen it effectual in arresting intermittents when given freely in warm decoction, immediately before the expected recurrence of the paroxysm; but it operated in this instance by its emetic rather than its tonic power. The medicine has also been used as a tonic and diaphoretic in remittent and typhoid fevers, and is said to have been productive of advantage in yellow fever. Given in warm infusion, so as to produce vomiting or copious perspiration, in the commencement of catarrh, it will frequently arrest that complaint. It has even been recommended as a diaphoretic in inflammatory rheumatism; and may prove serviceable if administered in the absence of general arterial excitement. As a tonic it has been given with advantage in dyspepsia, general debility, and other cases in which the simple bitters are employed.

With a view to its tonic effect, it is best administered in substance, or in cold infusion. The dose of the powder is twenty or thirty grains, that of the infusion a fluidounce, frequently repeated. (See *Infusum Eupatorii*

Perfoliati.) When the diaphoretic operation is required in addition to the tonic, the infusion should be administered warm, and the patient remain covered in bed. As an emetic and cathartic, a strong decoction, prepared by boiling an ounce with three half pints of water to a pint, may be given in doses of one or two gills, or more.

Off. Prep. Infusum Eupatorii Perfoliati. *U.S.* W.

EUPATORIUM PURPUREUM. *U.S. Secondary.*

Gravel-root.

"Eupatorium purpureum. Radix. *The root.*" *U. S.*

Eupatorium. See EUPATORIUM PERFOLIATUM.

Eupatorium purpureum. Willd. *Sp. Plant.* iii. 1759. This species of Eupatorium is, like the preceding, a perennial herbaceous plant. Its stem is hollow, of a purple colour, five or six feet high, and furnished with ovate lanceolate, serrate, rugosely veined, slightly scabrous leaves, which are petiolate, and placed four or five together in the form of whorls. The flowers are purple, consisting of numerous florets contained in an eight-leaved calyx. It grows in swamps and other low grounds, from Canada to Virginia, and flowers in August and September. The root is the officinal portion.

This, according to Dr. Bigelow, has a bitter, aromatic, and astringent taste; and is said to operate as a diuretic. Its vulgar name of *gravel-root* indicates the popular estimation of its virtues. W.

EUPATORIUM TEUCRIFOLIUM. *U.S. Secondary.*

Wild Horehound.

"Eupatorium teucrifolium. Herba. *The Herb.*" *U.S.*

Eupatorium. See EUPATORIUM PERFOLIATUM.

Eupatorium teucrifolium. Willd. *Sp. Plant.* iii. 1753.—*E. pilosum.* Walt. *Flor. Car.* 199.—*E. verbenæfolium.* Mich. *Flor. Am.* ii. 98. The wild horehound is an indigenous perennial, with an herbaceous stem about two feet high, supporting sessile, distinct, ovate, acute, scabrous leaves, of which the lower are coarsely serrate at the base, the uppermost entire. The flowers are small, white, consisting of five florets within each calyx, and disposed in the form of a corymb. The plant grows in low wet places, from New England to Georgia, and is very abundant in the Southern States. It is in flower from August to November. The whole herb is employed.

In sensible properties it corresponds with the *E. perfoliatum,* though less bitter and disagreeable to the taste. It is said to be tonic, diaphoretic, diuretic, and aperient; and in the South is much employed as a domestic remedy in intermittents and other fevers, to which the country upon the seaboard is subject. Dr. Jones, formerly president of the Georgia Medical Society, was the first to make its properties known to the profession. It is usually administered infused in water. One quart of the infusion, containing the virtues of an ounce of the plant, may be given in divided doses during the day. W.

EUPHORBIA COROLLATA. *U.S. Secondary.*

Large Flowering Spurge.

"Euphorbia corollata. Radix. *The root.*" *U.S.*

Euphorbia. *Sex. Syst.* Dodecandria Trigynia. *Linn.;* Monœcia Monadelphia. *Michaux.*—*Nat. Ord.* Euphorbiaceæ.

Gen. Ch. *Involucrum* caliciform, eight to ten toothed, exterior alternate dentures glanduloid or petaloid. *Stamina* indefinite, twelve or more, rarely less; *filaments* articulated. *Receptacle* squamose. *Female flower* solitary stipitate, naked. *Capsule* three-grained. *Nuttall.*

In the flower of the Euphorbiæ, the stamina are arranged two or more together, in distinct parcels, which correspond in number with the inner segments of the calyx. These parcels were considered by Michaux as distinct male florets, while the central stipitate germ, with its three bifid styles, was considered as a distinct female floret, and the calyx took the name of an involucre. He accordingly placed the genus in the class and order *Monœcia Monadelphia*, and in this respect has been followed by most American botanists. The genus Euphorbia contains very numerous species, which have the common property of yielding a milky juice. They are herbaceous or shrubby, with or without leaves; and the leafless species, which are chiefly confined to the African deserts, have fleshy, naked, or spiny stems, resembling the genus Cactus. They nearly all afford products which act powerfully as emetics and cathartics, and in over-doses give rise to dangerous if not fatal prostration, with symptoms of inflamed gastro-intestinal mucous membrane. Their milky juice, which concretes on exposure to the air, usually possesses these properties in a high degree, and, in addition, that of powerfully irritating the skin when externally applied. Two species only are acknowledged in our national Pharmacopœia, the *E. corollata* and *E. Ipecacuanha*, which are both indigenous. The *E. hypericifolia*, which is also indigenous, has recently been very highly commended as a remedy in dysentery after due depletion, diarrhœa, menorrhagia, and leucorrhœa, by Dr. W. Zollickoffer of Baltimore. He infuses half an ounce of the dried leaves in a pint of boiling water, and gives half a fluidounce every hour in dysentery till the symptoms begin to yield, the same quantity after every evacuation in diarrhœa, and two fluidounces morning, noon, and night in menorrhagia and fluor albus. The herb, according to Dr. Zollickoffer, is at first sweetish, afterwards harsh and astringent to the taste, and from his experiments appears to contain tannin. Its effects upon the system are those of an astringent and feeble narcotic. It differs, therefore, considerably, both in sensible and medicinal properties, from most of the other species of Euphorbia. (*Am. Journ. of the Med. Sciences*, xi. 22.)

Euphorbia Corollata. Willd. *Sp. Plant.* ii. 916; Bigelow, *Am. Med. Bot.* iii. 119. The *blooming* or *large flowering spurge*, in common language frequently called *milk-weed*, is a tall erect plant, with a large, perennial, branching, yellowish root, which sends up several stems from two to five feet in height, round and generally simple. The leaves, which stand irregularly upon the stem, and without footstalks, are oblong, obovate, wedge-form or linear, flat or revolute at the margin, smooth in some plants, and hairy in others. The flowers are disposed upon a large terminal umbel, with a five-leaved involucrum, and five trifid and dichotomous rays, at each fork of which are two oblong bractes. The calyx is large, rotate, white, with five obtuse segments, closely resembling a corolla, from which the species has been named. At the base of these divisions are five interior smaller segments, which are described as nectaries by many systematic writers, while the larger are considered as belonging to a real corolla. The stamens are twelve, evolving gradually, with double anthers. Many flowers have only stamens. The pistil, when existing, is stipitate, nodding, rounded, with three bifid styles. The fruit is a smooth, three-celled, three-seeded capsule.

The plant grows in various parts of the United States, from Canada to Florida, and abounds in Maryland and Virginia. It prefers a dry, barren, and sandy soil, seldom growing in woods or on the borders of streams. Its flowers appear in July and August. The root is the only part used.

This, when full grown, is sometimes an inch in thickness, and two feet in length. It is without unpleasant taste, producing only a sense of heat a short time after it has been taken. The medical virtues are said to reside in the cortical portion, which is thick, and constitutes two-thirds of the whole root. They are taken up by water and alcohol, and remain in the extract formed by the evaporation of the decoction or tincture.

Medical Properties and Uses. In a full dose, the root of the *E. corollata* operates actively and with sufficient certainty as an emetic, producing ordinarily several discharges from the stomach, and not unfrequently acting with considerable energy upon the bowels. In quantities insufficient to vomit, it excites nausea, almost always followed by brisk purging. In still smaller doses it is diaphoretic and expectorant. It cannot, however, like ipecacuanha, be given largely in cases of insensibility of stomach, without endangering hypercatharsis with inflammation of the mucous coat of the stomach and bowels. It is in fact greatly inferior to this emetic in mildness, while it is no less inferior to the tartarized antimony in certainty. It is objectionable as a purge, in consequence of the nausea which it occasions, when given in cathartic doses. Dr. Zollickoffer of Baltimore was the first to introduce it to the particular notice of the medical profession. It is little prescribed, and seldom kept in the shops. The dose of the dried root as an emetic is from ten to twenty grains, as a cathartic from three to ten grains. The recent root, bruised and applied to the skin, produces vesication. W.

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EUPHORBIA IPECACUANHA. *U.S. Secondary.*

Ipecacuanha Spurge.

"Euphorbia ipecacuanha. Radix. *The root.*" *U. S.*

Euphorbia. See EUPHORBIA COROLLATA.

Euphorbia Ipecacuanha. Willd. *Sp. Plant.* ii. 900; Barton, *Med. Bot.* i. 211; Bigelow, *Am. Med. Bot.* iii. 108. The *ipecacuanha spurge*, or, as it is sometimes called, *American ipecacuanha*, is a singular plant, varying so much in the shape and colour of its leaves, and in its whole aspect, that mere individual peculiarities might without care be attributed to a real specific difference. The root is perennial, of a yellowish colour, irregular, and very large, penetrating sometimes to the depth of six or seven feet in the sand, and in its thickest part measuring, when full grown, from three quarters of an inch to one inch and a half in diameter. The stems are numerous, herbaceous, erect or procumbent, smooth, dichotomous, jointed at the forks, white under the ground, red, pale-green, or yellow above, sometimes almost buried in the sand, usually forming thick low bunches upon its surface. The leaves are opposite, sessile, entire, smooth, generally oval, but sometimes round, obovate, or even lanceolate, or linear. They are small early in the spring, and increase in size with the age of the plant. Their colour varies from green to crimson. The flowers are solitary, and stand on long axillary peduncles. The calyx is spreading, with five exterior obtuse segments, and the same number of inner, smaller segments or nectaries. The fertile flowers have a roundish, drooping, pedicelled germ, crowned with six revolute stigmas. The capsule is three-celled, and contains three seeds.

The *E. Ipecacuanha* is indigenous, growing in pine barrens and other sandy places in the Middle and Southern States, especially along the seaboard, and abundant in New Jersey on the bank of the Delaware. It blooms from May to August. The root, which is the officinal portion, is, according to Dr. Barton, equally efficacious at whatever period collected.

The dried root is light and brittle, of a grayish colour externally, white within, inodorous, and of a sweetish not unpleasant taste. Its active principle has not been isolated. Dr. Bigelow inferred from his experiments, that it contained caoutchouc, resin, gum, and probably starch.

Medical Properties and Uses. It is an energetic, tolerably certain emetic, rather milder than the *E. corollata*, but, like that, disposed to act upon the bowels, and liable, if given in overdoses, to produce excessive nausea and vomiting, general prostration, and alarming hypercatharsis. It is therefore wholly unfit to supersede ipecacuanha. In small doses it is diaphoretic. The specific name of the plant indicates that the emetic property of the root has been long known. The late professor Barton alludes to it in his Collections; but it did not come into general notice till after the publication of Dr. W. P. C. Barton's Medical Botany. The dose of the powdered root is from ten to fifteen grains. W.

EUPHORBIÆ GUMMI-RESINA. *Lond.*

Euphorbium.

"Euphorbia officinarum. *Gummi-resina.*" *Lond.*

Off. Syn. EUPHORBIA CANARIENSIS. Gummi-resina. *Dub.*

Euphorbe, *Fr.;* Euphorbium, *Germ.;* Euforbio, *Ital., Span.*

Euphorbia. See EUPHORBIA COROLLATA.

Euphorbium is obtained from several species of Euphorbia, most abundantly from the *E. officinarum*, which grows in the North of Africa and at the Cape of Good Hope, the *E. Canariensis*, a native of the Canary Islands and Western Africa, and the *E. antiquorum*, inhabiting Egypt, Arabia, and the East Indies, and supposed to be the plant from which the ancients derived this resinous product. These species of Euphorbia bear a considerable resemblance in their general form to the *Cactus*, having leafless, jointed, angular stems, divided into branches of a similar structure, and furnished with double prickles at the angles. When wounded, they give out an acrid milky juice, which concretes upon the surface of the plant, and being removed, constitutes the euphorbium of commerce.

This occurs in the shape of tears, or in oblong or roundish masses, about the size of a pea or larger, often forked, and perforated with one or two small conical holes, produced by the prickles of the plant, around which the juice has concreted, and which sometimes remain in the holes. The masses are occasionally large and mixed with impurities. The surface is dull and smooth, bearing some resemblance to that of tragacanth; the consistence somewhat friable; the colour light yellowish or reddish; the odour scarcely perceptible; the taste at first slight, but afterwards excessively acrid and burning. The colour of the powder is yellowish. The sp. gr. of euphorbium is 1.124. Triturated with water it renders the liquid milky, and is partially dissolved. Alcohol dissolves a larger portion, forming a yellowish tincture, which becomes milky on the addition of water. Its constituents, according to Pelletier, are resin, wax, malate of lime, malate of potassa, lignin, bassorin, volatile oil, and water. Brandes found caoutchouc. Euphorbium contains no gum, and is therefore incorrectly called a gum-resin. The proportions of the ingredients are variously stated by different chemists, and probably vary in different specimens. The most abundant is resin, and the remainder consists chiefly of wax and malate of lime. The resin is excessively acrid, is soluble in alcohol, and when exposed to heat, melts, inflames, and burns with a brilliant flame, diffusing an agreeable odour. It is upon this principle that the acrimony of euphorbium chiefly depends.

Medical Properties and Uses. Euphorbium taken internally is emetic and cathartic, often acting with great violence, and in large doses producing severe gastric pain, excessive heat in the throat, and symptoms of great prostration. In consequence of the severity of its action, its internal use has been entirely abandoned. Applied to the mucous membrane of the nostrils, it excites violent irritation, attended with incessant sneezing, and sometimes bloody discharges. They who powder it are under the necessity of guarding their eyes, nostrils, and mouth against the fine dust which rises. Largely diluted with wheat flour or starch, it may be used as an errhine in amaurosis, deafness, and other obstinate affections of the head. Externally applied, it inflames the skin, often producing vesication; and on the continent of Europe is sometimes used as an ingredient of epispastic preparations. It is employed in veterinary practice, with a view to its vesicating power. As an article of the materia medica, however, it may well be dispensed with, and it has been very properly omitted in the Pharmacopœia of the United States. W.

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EXTRACTUM GLYCYRRHIZÆ. *U.S.*

Liquorice.

"Glycyrrhiza glabra. Radicis extractum. *Extract of the root.*" *U.S.*

Off. Syn. EXTRACTUM GLYCYRRHIZÆ, *Lond.*, *Dub.*; EXTRACTUM GLYCYRRHIZÆ GLABRÆ, *Ed.*

Extrait de reglisse, *Fr.*; Süssholzsaft, *Germ.*; Sugo di liquirizia, *Ital.*; Regaliza en bollos, *Span.*

For an account of the *Glycyrrhiza glabra*, see article GLYCYRRHIZA.

The London and Dublin Colleges give directions for the preparation of this extract; but as it is never prepared in this country, it very properly occupies, in the United States Pharmacopœia, a place in the catalogue of the Materia Medica.

Liquorice is an article of export from the North of Spain, particularly

Catalonia, where it is obtained in the following manner. The roots of the *G. glabra* having been dug up, thoroughly cleansed, and half dried by exposure to the air, are cut into small pieces, and boiled in water till the liquid is saturated. The decoction is then allowed to rest, and after the dregs have subsided, is decanted, and evaporated to the proper consistence. The extract thus prepared is formed into rolls from five to six inches long, by an inch in diameter, which are dried in the air, and wrapped in laurel leaves.

Much liquorice is also prepared in Calabria, according to M. Fée, from the *G. echinata* which abounds in that country. The process is essentially the same with that just described, but conducted with greater care; and the Italian liquorice is purer and more valuable than the Spanish. We have been informed that most of the extract brought to this country comes from the ports of Leghorn and Messina.

Crude liquorice is in cylindrical rolls, somewhat flattened and covered with bay leaves. When good, it is very black, dry, brittle, breaking with a shining fracture, of a very sweet, peculiar, slightly acrid or bitterish taste, and almost entirely soluble in water. It is frequently, however, very impure, either from adulteration or improper preparation. Starch, sand, the juice of prunes, &c., are sometimes added; and carbonaceous matter, and even particles of copper are found in it, the latter arising from the boilers in which the decoction is evaporated. Four pounds of the extract have yielded two drachms and a half of metallic copper. (*Fée.*) It is rarely quite soluble in water. Neumann obtained 460 parts of watery extract from 480 of Spanish liquorice. A bitter and empyreumatic taste are signs of inferior quality. Before being used internally it generally requires to be purified.

The refined liquorice kept in the shops in small cylindrical pieces not thicker than a pipe stem, is prepared by dissolving the impure extract in water without boiling, straining the solution, and evaporating. The object of this process is to separate not only the insoluble impurities, but also the acrid oily substance, which is extracted by long boiling from the liquorice root, and is necessarily mixed with the unrefined extract. It is customary to add during the process a portion of sugar, and sometimes perhaps mucilage or glue; and flour or starch is a frequent adulteration. Excellent liquorice is prepared in some parts of England from the root cultivated in that country. The Pontefract cakes are small lozenges of liquorice of a very superior quality, made in the vicinity of Pomfret.

Medical Properties and Uses. Liquorice is a useful demulcent, much employed as an addition to cough mixtures, and frequently added to infusions or decoctions, in order to cover the taste or obtund the acrimony of the principal medicine. A piece of it held in the mouth and allowed slowly to dissolve, is often found to allay cough by sheathing the irritated membrane of the fauces. It is used in pharmacy to impart consistence to pills and troches, and to modify the taste of other medicines.

Off. Prep. Decoctum Aloës Compositum, *Lond., Dub.;* Pilulæ Opiatæ, *Ed.;* Pilulæ Scilliticæ, *Ed.;* Tinctura Aloës, *U.S., Lond., Ed., Dub.;* Tinctura Opii Camphorata, *U.S.;* Tinctura Rhei et Sennæ, *U.S.;* Trochisci Glycyrrhizæ Glabræ, *Ed.;* Trochisci Glycyrrhizæ et Opii, *U.S., Ed.*

W.

FERRUM.

Iron.

Fer, *Fr.;* Eisen, *Germ.;* Ferro, *Ital.;* Hierro, *Span.*

Iron is the most abundant and useful of the metals, and so interwoven with the wants of mankind, that the extent of its consumption by a nation may be taken as an index of its progress in civilization. It is universally diffused throughout nature, not only in the mineral kingdom, but also in vegetables and animals. There are very few minerals in which traces of it may not be found, and it is an essential constituent in many parts of animals, but particularly in the blood. It is one of the few metals which are devoid of deleterious action on the animal economy.

Iron occurs, 1. native; 2. sulphuretted, forming magnetic and cubic pyrites; 3. oxidized, embracing the magnetic, specular, red, brown, and argillaceous oxides of iron; 4. in saline combination, forming the carbonate, sulphate, phosphate, arseniate, and chromate of iron. Those minerals of iron which admit of being worked to advantage, are called iron ores. These include the different native oxides, and the carbonate (sparry iron). The best iron is obtained from those varieties of native oxide, usually called magnetic iron ore and specular iron ore. These occur very abundantly in Sweden, and furnish the superior iron of that country. As a general rule, those ores yield the best iron which occur in primitive formations.

Extraction. The mode of extracting iron from its ores varies somewhat with the nature of the ore; but the general principles of the operation are the same for all. The ore, previously roasted and coarsely pulverized, is exposed to the action of a strong heat in contact with carbonaceous matter, such as charcoal or coke, and in connexion with some flux, capable of fusing with the impurities of the ore. The flux varies with the nature of the ore, and is generally either lime or clay; lime being employed when the ore is argillaceous, clay when it is calcareous. The flux, whatever it may be, enters into fusion with the impurities, and forms what is called the slag; while the carbonaceous matter, acting on the oxide of iron, reduces it to the metallic state. The reduced metal, from its density, occupies the lower part of the furnace, and is protected from the action of the air by the melted slag which floats on its surface. When the reduction is completed, the slag is allowed to run out of a hole in the side of the furnace, and the melted metal, by an aperture at its bottom, the latter being received into oblong triangular moulds, where it solidifies in masses, known in commerce by the name of pig or cast iron. In this state the metal is brittle and far from being pure, as it is contaminated with a portion of charcoal, unreduced ore, and earthy impurities. It is purified, and thus brought to the state of malleable iron, by being fused by a strong heat, and subjected to the action of a current of air on its surface. By these means the undecomposed ore is reduced, the earthy impurities are made to rise to the surface as a slag, and the carbon is burnt out. As the metal approaches to purity, it becomes less and less fusible, and at last consolidates, though the temperature of the furnace continues the same. The metal is then taken out, and by means of ponderous hammers, or rollers, its particles are beaten or pressed together so as to form one tenacious mass. It is finally drawn out into bars of a convenient size, when it constitutes the malleable iron of commerce.

Iron mines occur in most countries, but more particularly in northern ones. In Spain the principal mines furnish sparry iron, and the red and brown oxides. The chief iron ores of France are the sparry iron, and the specular, brown, and argillaceous oxides, and of Germany, the sparry iron and brown oxide. The island of Elba is celebrated for its rich and abundant specular oxide. The ores which furnish the celebrated Swedish iron have already been indicated.

In the United States iron is abundant. The principal ores which are worked are the magnetic, brown, and argillaceous oxides. They occur in the greatest abundance in the states of New Hampshire, Massachusetts, Rhode-Island, Connecticut, New York, New Jersey, and Pennsylvania. The ores of the three last mentioned states rival the best Swedish in quality. In 1822, Cleaveland estimated the annual product of our iron mines at about 30,000 tons of bar iron, and 60,000 of cast iron.

Properties. Iron is a hard, malleable, very ductile and tenacious metal, of a grayish-white colour and fibrous texture, and having a slight styptic taste, and a sensible odour when rubbed. Its sp. gr. is about 7.7, and its fusing point very high. It possesses the magnetic and welding properties. It is combustible, and when heated to whiteness, burns in atmospheric air, and with brilliant scintillations in oxygen gas. At a red heat, its surface is converted into black oxide, and by the combined agency of air and moisture at common temperatures, it becomes covered with a reddish matter, called *rust*, which consists of the hydrated peroxide. It combines with all the nonmetallic bodies, except hydrogen and nitrogen, and with most of the metals; its equivalent number being 28. It forms two regular oxides, a protoxide and peroxide; and these by combining together produce a third, of a black colour, formerly erroneously considered to be the protoxide. This last is called in the peculiar nomenclature of Berzelius, the *ferroso-ferric oxide;* but it is, perhaps, more convenient to designate it as the *black oxide.* The protoxide of iron is of a dark blue colour, attracted by the magnet, and spontaneously combustible in the air, being converted into peroxide. It is the base of green vitriol, and of the green salts of iron generally. It is very prone to absorb oxygen, and hence the salts which contain it are soon partially converted, when in solution, into persalts. It consists of one equivalent of iron 28, and one equiv. of oxygen 8 = 36. The peroxide is readily obtained pure by dissolving iron in nitro-muriatic acid, adding ammonia, and igniting the precipitate obtained. It is of a red colour, not attracted by the magnet, and forms salts, which for the most part have a reddish colour. It is composed of two equiv. of iron 56, and three of oxygen 24 = 80. It is, therefore, strictly speaking, a *sesquioxide.* The black oxide exists in the native magnetic oxide, and in certain ferruginous salts after they have absorbed a certain definite proportion of oxygen. It consists of one equiv. of protoxide 36, and one of peroxide 80 = 116. Iron, combined with minute portions of carbon, and perhaps of the radicals of silica and alumina, forms *steel*, a modification of iron formerly used in medicine, but now very properly laid aside. It also unites, when oxidized, with various acids, giving rise to an important class of salts, several of which, as the muriate, carbonate, sulphate, phosphate, ferrocyanate, tartrate, and acetate, are used in medicine.

Iron is readily detected, even in minute quantities, by bringing it to the state of peroxide in solution, and testing it with ferrocyanate of potassa, or tincture of galls, the former of which will strike a deep blue, the latter a black colour. The object of bringing it to the state of peroxide is readily effected by boiling the solution containing it with a little nitric acid.

Medical Properties. The preparations of iron are powerfully tonic, raising the pulse, promoting the secretions, and increasing the colouring matter of the blood. They are useful in diseases characterized by debility and relaxation of fibre, and a languid circulation, more especially when the consequence of inordinate discharges. The diseases in which they are most usually employed are chlorosis, hysteria, fluor albus, gleet, scrofula, rickets, chorea, and all passive hemorrhages. Chalybeates are also proper in palsy after the inflammatory excitement has subsided, in dyspepsia dependent upon deficient energy of the digestive functions, and in neuralgia. They are contra-indicated in all inflammatory diseases, producing, when injudiciously prescribed, heat, thirst, headach, difficulty of breathing, and other symptoms of an excited circulation. The medical effects of iron, as modified in its different combinations, will be noticed under the head of each preparation separately.

The following table embraces all the preparations of iron to be found in the United States and British Pharmacopœias, together with the synonymes.

Iron is officinal,—

I. IN ITS METALLIC STATE.

Ferri Filum, *U.S.;* Ferrum. Ferri Fila, *Lond.;* Ferri Fila, *Ed.;*
[Ferrum. Fila, *Dub.*
Ferri Ramenta, *U.S.;* Ferrum. Ferri Ramenta, *Lond.;* Ferri Lima-
[tura, *Ed.;* Ferrum. Scobs, *Dub.*
Limatura Ferri Purificata, *Ed.*
Mistura Ferri Aromatica, *Dub.*

II. OXIDIZED.

Ferrum. Oxydi Squamæ, *Dub.;* Oxidum Ferri Nigrum, *Ed.*
Ferri Oxydum Nigrum, *Dub.;* Oxidum Ferri Nigrum Purifica-
[tum, *Ed.*
Ferri Oxidum Rubrum, *U.S.;* Oxidum Ferri Rubrum, *Ed.;* Ferri
[Oxydum Rubrum, *Dub.*
Ferrum Ammoniatum, *U.S. Lond.;* Murias Ammoniæ et Ferri,
[*Ed.*
Tinctura Ferri Ammoniati, *Lond.*
Emplastrum Ferri, *U.S.;* Emplastrum Oxidi Ferri Rubri, *Ed.;*
[Emplastrum Thuris, *Dub.*

III. SULPHURETTED.

Ferri Sulphuretum, *U.S., Dub.;* Sulphuretum Ferri, *Ed.*

IV. IN SALINE COMBINATION.

Ferri Ferrocyanas, *U.S.;* Ferri Cyanuretum, *Dub.;* Anglicé, *Prus-*
[*sian blue.*
Ferri Acetas, *Dub.*
Ferri Acetatis Tinctura, *Dub.*
Tinctura Acetatis Ferri cum Alcohol, *Dub.*
Ferri Carbonas Præcipitatus, *U.S.;* Ferri Subcarbonas, *Lond.;*
[Carbonas Ferri Præcipitatus, *Ed.;* Ferri Carbonas, *Dub.*
Mistura Ferri Composita, *U.S., Lond., Dub.*
Pilulæ Ferri Compositæ, *U.S., Lond., Dub.*
Liquor Ferri Alkalini, *Lond.*
Ferri Carbonas Præparatus, *U.S.;* Sub-Carbonas Ferri Præparatus,
[*Ed.;* Ferri Rubigo, *Dub.*
Ferri et Potassæ Tartras, *U.S.;* Ferrum Tartarizatum, *Lond.;* Tar-
[tras Potassæ et Ferri, *Ed.;* Ferri Tartarum, *Dub.*
Vinum Ferri, *Lond.*
Ferri Phosphas, *U.S.*

Ferri Sulphas, *U.S.*, *Lond.*, *Dub.;* Sulphas Ferri, *Ed.*
  Sulphas Ferri Exsiccatus, *Ed.*
  Pilulæ Sulphatis Ferri Compositæ, *Ed.*
Tinctura Ferri Muriatis, *U.S.*, *Lond.;* Tinctura Muriatis Ferri, *Ed.;*
  [Muriatis Ferri Liquor, *Dub.*

In the foregoing table, the more complex preparations are arranged as subheads to the simple ones from which they are derived or with which they are most closely connected. B.

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FERRI FILUM. *U.S.*

Iron Wire.

FERRI RAMENTA. *U.S.*

Iron Filings.

Off. Syn. FERRUM. Ferri Ramenta et Fila, *Lond.;* FERRI FILA. FERRI LIMATURA, *Ed.;* FERRUM. Fila. Scobs, *Dub.*

Fil de fer, *Fr.;* Eisendraht, *Germ.;* Fil di ferro, *Ital.;* Hilo de hierro, *Span.*

Limailles de fer, *Fr.:* Eisenfeilicht, *Germ.;* Limatura di ferro, *Ital.;* Limadura de hierro. *Span.*

Iron, when employed in pharmaceutical operations, should be of the purest kind; and hence the different Pharmacopœias direct it, when wanted in small masses, to be in the form of iron wire, which is necessarily made from the softest and most malleable iron, and is readily cut into pieces of convenient size. The metal, however, for internal exhibition and for some preparations, requires to be finely subdivided, and hence it is officinal also in the form of filings.

Medical Properties of Iron Filings. Iron, in its uncombined state, has no action on the animal economy; and hence iron filings would prove inert, were it not that they met with acid in the stomach, or some other agent, whereby they become oxidized. That this change really takes place, is proved by the black stools to which they invariably give rise. During the solution of iron in the stomach, the oxygen furnished to the metal is derived from water, the hydrogen of which by being disengaged gives rise to unpleasant eructations. Iron filings are generally obtained from the workshops of the blacksmith; and as furnished from this source are generally very impure, and require, before exhibition, to undergo purification, for which a process is directed by the Edinburgh College. (See *Limatura Ferri Purificata.*) The other Pharmacopœias have no purified filings, and this is an omission of some importance; as the common filings are evidently too impure for internal use. The dose is from five to twenty grains, given in molasses, or made up into an electuary with honey, or into pills with some bitter extract. Upon the whole, there is reason to believe that no medical effects can be expected from iron exhibited in the metallic state, which cannot be as well obtained, and with less inconvenience to the patient, from its different combinations.

Off. Prep. Ferri Carbonas Præparatus, *U. S.*, *Ed.*, *Dub.;* Ferri Sulphas, *U.S.*, *Lond.*, *Dub.;* Ferri Sulphuretum, *U.S.*, *Ed.*, *Dub.;* Ferrum Tartarizatum, *Lond.*, *Dub.;* Limatura Ferri Purificata, *Ed.*; Liquor Ferri Alkalini, *Lond.;* Mistura Ferri Aromatica, *Dub.;* Vinum Ferri, *Lond.*

B.

FERRUM. Oxydi Squamæ. *Dub.*

Scales of the Oxide of Iron.

Off. Syn. OXIDUM FERRI NIGRUM. *Ed.*

Batitures de fer, *Fr.;* Eisenschlag, *Germ.;* Scaglia di ferro, *Ital.;* Escamas de hierro, *Span.*

This form of oxidized iron is obtained when iron is heated to redness and subjected to the blows of a hammer on an anvil. The heat causes the iron to be covered with a thin crust of oxide, which is detached in scales during the hammering. These are formed abundantly in the operations of the blacksmith, and collect around the anvil.

Scales of iron consist of small, black, brittle masses, attracted by the magnet, and without taste or smell. When reduced to powder, they have a dull grayish-white colour. Their precise composition is not well settled; but it is certain that they do not consist of the regular *black oxide.* (See *Ferrum.*) The results of Mosander seem to show that they consist of two distinct layers; the inner, of uniform composition, consisting of six equiv. of protoxide to one of peroxide; and the outer, of a variable mixture of the two oxides, the peroxide predominating on the surface, and diminishing gradually inwards.

Medical Properties. These scales have the general medical properties of the ferruginous preparations, but are not fit for medicinal use until they have undergone preparation. The Dublin and Edinburgh Colleges give formulæ for this purpose, and designate the prepared substance by a distinct name. (See *Ferri Oxydum Nigrum,* Dub.) This is the only officinal preparation of the scales. B.

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FERRI FERROCYANAS. *U.S.*

Ferrocyanate of Iron.

Off. Syn. FERRI CYANURETUM. *Dub.*

Prussiate of iron, Cyanuret of iron, Prussian blue; Hydro-ferro-cyanate de peroxide de fer, Bleu de Prusse, *Fr.;* Berlinerblau, Pariserblau, *Germ.;* Azzuro di Berlino, *Ital.;* Azul de Prussia, *Span.*

Prussian blue was included in the materia medica list of the first United States Pharmacopœia, published in 1820, on account of its being connected indirectly with the preparation of hydrocyanic acid, and has been very properly retained in the revised edition of 1830. It was made officinal by the Dublin College, in their revised Pharmacopœia of 1826, for the same reason that induced its original insertion into our Pharmacopœia. The London and Edinburgh Colleges have not as yet adopted this substance, nor, indeed, any of the prussic compounds.

Prussian blue was discovered by accident in 1710, by a preparer of colours at Berlin, named Diesbach. Being desirous of precipitating a lake from a mixed solution of cochineal, alum, and sulphate of iron, by means of carbonate of potassa, he performed the experiment with an alkali which had been employed in connexion with animal matters, and unexpectedly obtained a blue precipitate. Following up the experiment, he was enabled to determine the precise ingredients necessary for its formation, and thus laid the foundation of the manufacture of this beautiful pigment, which came to be called, from the country of its discovery, Prussian blue. The mode of preparing it was kept secret until 1724, when Woodward published the process in the Philosophical Transactions of London. Since that time it has been extensively manufactured on a large scale for the purposes of the arts.

Preparation. On a small scale, Prussian blue may be obtained perfectly pure, by double decomposition between ferrocyanate of potassa, and an acid solution of persulphate or permuriate of iron. In the arts the process is as follows. A mixture made of equal parts of carbonate of potassa (pearlash of commerce), and animal matter, such as dried blood, hair, the shavings of horn, &c., is calcined at a red heat in an iron vessel, until it becomes pasty. The mass, when cold, is thrown by portions at a time into twelve or fifteen times its weight of water, with which it is stirred for half an hour. The whole is then put upon a linen filter; and the clear solution obtained is precipitated by a mixed solution of two parts of alum and one of the sulphate of the protoxide of iron. An effervescence occurs, due principally to carbonic acid; and a very abundant precipitate takes place, of a blackish-brown colour. This precipitate is washed by decantation, by means of a large quantity of water, which is renewed every twelve hours. By these washings, which last from twenty to twenty-five days, the precipitate becomes, successively, greenish-brown, blueish-brown, and finally deep blue. When of the latter colour, it is collected and allowed to drain upon a cloth, after which it is divided into cubical masses, dried, and thrown into commerce.

Properties. Prussian blue is an insipid, inodorous substance, generally in the form of oblong rectangular cakes, of a rich deep blue colour. It is heavier than water, and its fracture has an appearance resembling bronze, which is distinguished from the similar appearance of indigo by its being removed when rubbed with the nail, whereas in indigo, it is increased by friction. It is completely insoluble in water or alcohol, as also in the mineral acids, except the sulphuric. In this acid in a concentrated state it dissolves, forming a white compound, from which the Prussian blue is precipitated unchanged by water. Nitric acid decomposes it, and strong muriatic acid takes up a part of the iron, and gives rise to the formation of ferrocyanic acid. Boiled with peroxide of mercury it generates bicyanuret of mercury. (See *Hydrargyri Cyanuretum.*) Exposed to destructive distillation, it furnishes at first a little water and hydrocyanate of ammonia, and afterwards carbonate of ammonia; and there remains in the retort a black carbonaceous residue of tritocarburet of iron.

Composition. Prussian blue, when pure, is, according to Berzelius, a double cyanuret, consisting of three eq. of the protocyanuret of iron, united with two eq. of the sesquicyanuret of the same metal. Its entire composition is represented by nine eq. of cyanogen, combined with seven eq. of iron. The theory of its formation is complicated. By the calcination of the animal matters with pearlash, cyanuret of potassium is formed. This, by double decomposition with the protoxide of iron of the sulphate of iron, gives rise to the protocyanuret of iron, and potassa, the latter of which unites with the sulphuric acid, so as to form sulphate of potassa. Six eq. of protocyanuret of iron, thus formed, are acted on by the oxygen of the air, with the effect of detaching two eq. of iron, which by uniting with three eq. of oxygen, become peroxide of iron. The six eq. of protocyanuret, by undergoing this change, are converted into a compound of six eq. of cyanogen and four eq. of iron, corresponding with two eq. of the sesquicyanuret of iron. The two eq. of sesquicyanuret, thus generated, combine with three eq. of protocyanuret of iron, to form the pure Prussian blue. The sulphate of potassa formed is washed away; but the peroxide of iron remains in the Prussian blue of commerce as an impurity. Another impurity in the commercial pigment is alumina, which is precipitated from the alum, employed conjointly with the protosulphate of iron as a precipitant. This earth serves to give the pigment a body, which renders it useful in the arts. For an account of the properties and composition of *cyanogen*, see *Acidum Hydrocyanicum. U. S.*

Medical Properties, &c. Prussian blue is supposed to act as a tonic, febrifuge, and alterative. Dr. Zollickoffer of Maryland has recommended it as a remedy in intermittent and remittent fevers, and deems it to be particularly adapted to such cases occurring in children, on account of the smallness of the dose and its want of taste. He considers it more certain, prompt, and efficacious than the bark; while it has the advantage of being admissible in the state of pyrexia, and of not disagreeing with the most irritable stomach.* It has also been used by Dr. Kirchoff of Ghent in epilepsy with good success. Dr. Bridges of Philadelphia exhibited it in a case of severe and protracted neuralgia of the face, with very considerable relief, after all the more usual remedies in this complaint had been tried with little or no benefit. In the course of two days, the violence of the disease was subdued, and in a short period afterwards a greater freedom from pain was occasioned than had been experienced for many years. The medicine, in this case, produced no perceptible effect, besides relieving the disease, except that of a very mild tonic.

The dose of Prussian blue for an adult is about five grains, repeated three times a day, and gradually increased according to its effects. It must be here recollected, however, that we allude to the commercial substance, which contains a considerable quantity of alumina and peroxide of iron, and not to the chemically pure cyanuret, of which the dose is necessarily smaller. It is sometimes employed as an application to ill-conditioned ulcers, in the proportion of a drachm to an ounce of some simple ointment. Its only pharmaceutical use is to form bicyanuret of mercury, as a preliminary step to the preparation of hydrocyanic acid.

Off. Prep. Hydrargyri Cyanuretum. *U.S., Dub.* B.

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FICUS. *U.S.*

Figs.

"Ficus carica. Fructus. *The fruit.*" *U.S.*

Off. Syn. CARICÆ FRUCTUS. Ficus Carica. Fructus exsiccatus. *Lond.;* FICI CARICÆ FRUCTUS. Fructus siccatus. *Ed.;* FICUS CARICA. Fructus siccatus. *Dub.*

Figues, *Fr.;* Feigen, *Germ.;* Fichi, *Ital.;* Higos, *Span.*

FICUS. *Sex. Syst.* Polygamia Diœcia.—*Nat. Ord.* Urticæ, *Juss.;* Atrocarpeæ, *R. Brown, Lindley.*

Gen. Ch. *Common receptacle* turbinate, fleshy, converging, concealing the florets either in the same or distinct individuals. MALE. *Calyx* three-parted. *Corolla* none. *Stamens* three. FEMALE. *Calyx* five-parted. *Corolla* none. *Pistil* one. *Seed* one, covered with the closed, persistent, somewhat fleshy calyx. *Willd.*

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* See "A Treatise on the Use of Prussian Blue in Intermitting and Remitting Fevers, by William Zollickoffer, M. D." Frederick, Maryland, 1822.

Ficus Carica. Willd. *Sp. Plant.* iv. 1131; Woodv. *Med. Bot.* p. 714. t. 244. The fig-tree, though usually not more than twelve feet in height, sometimes rises in warm climates to twenty-five or even thirty feet. Its trunk, which seldom exceeds seven inches in diameter, is divided into numerous spreading branches, covered with a brown or ash-coloured bark. Its large, palmate leaves, usually divided into five obtuse lobes, are deep green and shining upon their upper surface, pale green and downy beneath, and stand alternately on strong round footstalks. The flowers are situated within a common receptacle, placed solitarily upon a short peduncle in the axils of the upper leaves. This receptacle, the walls of which become thick and fleshy, constitutes what is commonly called the fruit; though this term is, strictly speaking, applicable to the small seeds found in great numbers on the internal surface of the receptacle, to which they are attached by fleshy pedicels. Cultivation has produced in the fig, as in the apple and peach, an almost infinite diversity in shape, size, colour, and taste. It is usually, however, turbinate or top-shaped, umbilicate at the large extremity, of the size of a small pear, of a whitish, yellowish, or reddish colour, and of a mild, mucilaginous, saccharine flavour.

The fig-tree is supposed to have come originally from the Levant. It was introduced at a very early period into various parts of the South of Europe, and is now very common throughout the whole basin of the Mediterranean, particularly in Italy and France. To hasten the maturation of the fruit, it is customary to puncture it with a sharp pointed instrument covered with olive oil. The ancient process of *caprification* is still practised in the Levant. It consists in attaching branches of the wild fig-tree to the cultivated plant. The fruit of the former contains great numbers of the eggs of an insect of the genus Cynips, the larvæ of which, as soon as they are hatched, spread themselves over the cultivated fruit, and by conveying the pollen of the male organs over which they pass to the female florets, hasten the impregnation of the latter, and cause the fig to come quickly to perfection, which might otherwise ripen very slowly, or wither and drop off before maturity. Some authors attribute the effect to the piercing of the fruit by the young insects.

The figs, when perfectly ripe, are dried by the heat of the sun or in ovens. Those brought to the United States come chiefly from Smyrna, packed in drums or boxes. They are more or less compressed, and are usually covered in cold weather with a whitish saccharine efflorescence, which melts in the middle of summer and renders them moist. The best are yellowish or brownish, somewhat translucent when held to the light, and filled with a sweet viscid pulp, in which are lodged numerous small yellow seeds. They are much more saccharine than the fresh fruit. Their chief constituents are mucilage and sugar.

Medical Properties and Uses. Figs are nutritious, laxative, and demulcent. In the fresh state, they are considered in the countries where they grow a wholesome and agreeable aliment. As we obtain them, they are apt when eaten freely, to produce flatulence, pain in the bowels, and diarrhœa. Their chief medical use is as a laxative article of diet in cases of constipation. They occasionally enter into demulcent decoctions; and when roasted or boiled, and split open, may be applied as a suppurative cataplasm to parts upon which an ordinary poultice cannot be conveniently retained.

Off. Prep. Confectio Sennæ, *U.S.*, *Lond.;* Decoctum Hordei Compositum, *Lond.*, *Dub.;* Electuarium Sennæ Compositum, *Ed.* W.

FILIX MAS. *U.S. Secondary.*

Male Fern.

"Aspidium filix mas. *The root.*" *U.S.*

Off. Syn. FILICIS RADIX. Aspidium Filix Mas. *Lond.;* ASPIDII FILICIS MARIS RADIX. *Ed.;* FILIX MAS. ASPIDIUM FILIX MAS. Radix. *Dub.*

Fougère male, *Fr.;* Johanniswurzel, *Germ.;* Félce maschio, *Ital.;* Helecho, *Span.*

Aspidium. *Sex. Syst.* Cryptogamia Filices.—*Nat. Ord.* Filices.

Gen. Ch. Fructification in roundish points, scattered, not marginal. *Involucre* umbilicated, open almost on every side. *Smith.*

Aspidium Filix Mas. Willd. *Sp. Plant.* v. 259; Smith, *Flor. Britan.*—*Polypodium Filix Mas.* Linn.; Woodv. *Med. Bot.* p. 795. t. 267. The male fern has a perennial, horizontal root, from which numerous annual fronds or leaves arise, forming tufts from a foot to four feet in height. The stipe or footstalk, and midrib, are thickly beset with brown, tough, transparent scales; the frond itself is oval lanceolate, acute, pinnate, and of a bright green colour. The pinnæ or leaflets are remote below, approach more nearly as they ascend, and run together at the summit of the leaf. They are deeply divided into lobes, which are of an oval shape, crenate at the edges, and gradually diminish from the base of the pinna to the apex. The fructification is in small dots on the back of each lobe, placed in two rows near the base, and distant from the edges.

The male fern is indigenous, growing in shady pine forests from New Jersey to Virginia. (*Pursh.*) It is a native also of Europe, Asia, and the North of Africa. In the American plant, the leaflets are said by Pursh to be more obtuse, and oftener doubly serrated than in the European.

The proper period for collecting the root is during the summer, when, according to M. Peschier of Geneva, it abounds more in the active principle than at any other season. The same gentleman informs us that it deteriorates rapidly when kept, and in about two years becomes entirely inert. The roots of other species of fern are frequently substituted for the officinal; and in the dried state it is difficult to distinguish them.

Properties, &c. As taken from the ground, the root consists of a long cylindrical caudex, around which are closely arranged, overlapping each other like the shingles of a roof, the remains of the leafstalks or stipes, which are an inch or two in length, from two to four lines thick, somewhat curved and directed upwards, angular, brown, shining, and surrounded near their origin from the root with thin silky scales, of a light brown colour. From between these remains of the footstalks emerge numerous small radical fibres. The whole root thus constituted, presents a somewhat flexible, cylindrical mass, one or two inches thick, and a foot or more in length. In this form, however, it is not usually found in our shops. The whole is ordinarily broken up into fragments, consisting of the separated remains of the leaf stalks before described, with a small portion of the substance of the root attached to their base, where they are surrounded by the silky scales. These fragments ordinarily present the appearance of having been long kept, and are probably, as a general rule, much deteriorated by time. The male fern root is brought to us from Europe, but might perhaps be more advantageously collected in this country. The following observations are made by Geiger in relation to its collection and preservation. The inner parts of the fresh root and of the portions of stalk attached to it, are fleshy and of a light yellowish-green colour. In collecting them, all the black discoloured portions should be cut away, the fibres and scales separated, and only the sound green parts preserved. These should be immediately but carefully dried, and then reduced to powder; and the powder should be kept in small well stopped glass bottles. The powder thus prepared has a pale yellowish colour with a greenish tinge.

Dried fern root is externally of a brown colour, internally yellowish-white or reddish, with a peculiar but feeble odour, which is most obvious in the powder and decoction, and a sweetish, bitter, astringent, nauseous taste. From the analysis of M. Morin, an apothecary of Rouen, it appears to contain a volatile oil, a fixed oil, gallic and acetic acids, uncrystallizable sugar, tannin, starch, a gelatinous matter insoluble in water and alcohol, lignin, and various earthy and saline substances. M. Peschier found its active principle soluble in ether. According to this chemist, its constituents are adipocire, an aromatic volatile oil, an aromatic and virose fixed oil, a brown resin, a green colouring principle, a reddish-brown colouring principle, extractive, acetic acid, and muriate of potassa. Ether extracts the adipocire along with the active ingredient, but deposites the former on standing.

In powdering the root the internal parenchymatous portion only should be preserved.

Medical Properties and Uses. Male fern is slightly tonic and astringent; but produces, when taken internally, no very obvious effects upon the system. It was used by the ancients as a vermifuge; and is mentioned in the works of Dioscorides, Theophrastus, Galen, and Pliny. Its anthelmintic powers were also noticed by some of the earlier modern writers, among whom was Hoffmann. But it does not appear to have been generally known to the profession, till attention was attracted to it, about the year 1775, by the publication of the mode of treating tænia employed by Madame Nouffer. This lady, who was the widow of a surgeon in Switzerland, had acquired great celebrity in the cure of tape-worm by a secret remedy. Her success was such as to attract the attention of the medical profession at Paris; and some of the most eminent physicians of that city, who were deputed to examine into the subject, having reported favourably of the remedy, the secret was purchased by the king of France, and published by his order. The outlines of her plan were to give a dose of the powdered root of the male fern, and two hours afterwards a powerful cathartic, to be followed, if it should not operate in due time, by some purging salt; and this process was to be repeated with proper intervals, till the worm should be evacuated. A German physician by the name of Herrenschwand, had used the male fern in a manner somewhat similar before Madame Nouffer's secret was known. The remedy became very popular for a time, and was found successful in numerous instances; but the profession has now generally settled down in the opinion that the good which resulted was owing more to the purgatives than to the fern. Instances, however, are recorded, in which cures were effected by the root without the use of cathartics; and amid the general scepticism on the subject, physicians are still found who warmly advocate the anthelmintic powers of the medicine. Dr. Peschier assures us that, in the course of nine months, one hundred and fifty tape-worms had been expelled by the ethereal extract of the male fern root. Dr. Ebers has found the same preparation completely successful in curing eight cases of tænia. (*Journ. de Chimie Médicale, Fev.* 1829.) He states that the medicine acts specifically against the worm, which it speedily destroys, and thus favours its expulsion from the body, without producing any severe or unpleasant symptoms. The testimony of Brera is also strongly in favour of the remedy, which he has found effectual even against the armed tænia. Perhaps the different results obtained by different practitioners may in part be ascribed to the variable strength and character of the root, dependent upon the season at which it was collected, and the length of time it has been kept.

The medicine may be given in powder, or, as recommended by Dr. Peschier, in ethereal extract. The dose of the powder is from one to three drachms, to be given in the form of electuary or emulsion, and repeated morning and evening for one or two days successively. The dose of the extract is from twelve to twenty-four grains. The decoction has also been employed in the proportion of an ounce of the root to a pint of water. It is customary to follow the medicine by some brisk cathartic, though Dr. Peschier does not consider this essential. Dr. Mayor of Geneva recommends very highly the oil of fern, in the dose of from thirty to fifty drops, one half to be taken at night, the other half in the morning, and followed at the interval of an hour, by an ounce and a half of castor oil. W.

FŒNICULUM. *U.S.*

Fennel Seed.

"Anethum fœniculum. Semina. *The seeds.*" *U. S.*

Off. Syn. FŒNICULI SEMINA. Anethum Fœniculum. Semina. *Lond.:* ANETHI FŒNICULI SEMINA. *Ed.;* FŒNICULUM. ANETHUM FŒNICULUM. Semina. *Dub.*

Fenouil, *Fr.;* Fenchel, *Germ.;* Finnocchio, *Ital.;* Hinojo, *Span.*

Anethum. See ANETHI SEMINA.

Anethum Fœniculum. Willd. *Sp. Plant.* i. 1469; Woodv. *Med. Bot.* p. 127. t. 49. Fennel has a perennial, tapering root, and an annual, erect, round, striated, smooth, green, and branching stem, which usually rises three or four feet in height. The leaves, which stand alternately at the joints of the stem, upon membranous striated sheathes, are many times pinnate, with long, linear, pointed, smooth, deep green, leaflets. The flowers are yellow, and form large, many-rayed umbels, destitute both of general and partial involucres. The corolla consists of five ovate, pointed leaflets, with their extremities turned inwards. The flower is succeeded by two ovate seeds.

There are several varieties of this plant; but the sweet fennel, derived originally from the South of Europe, and cultivated in our gardens, is the one which furnishes the seeds of the shops. The whole plant has an aromatic odour and taste, dependent on a volatile oil by which it is pervaded. The roots were formerly employed in medicine, but are greatly inferior in virtue to the seeds, which are now the only officinal portion. These are sometimes imported; but those produced in our own gardens are perhaps preferable on account of their greater freshness.

Fennel seeds are oblong oval, from one to three or four lines in length, flat on one side, convex on the other, not unfrequently connected by their flat surfaces, straight or slightly curved, of a grayish-green colour, with longitudinal yellowish ridges on the convex surface. Their odour is fragrant, their taste warm, sweet, and agreeably aromatic. The seeds of domestic growth are usually smaller and darker, but sweeter than the imported. They impart their virtues to hot water, but more abundantly to alcohol. Their essential oil may be separated by distillation with water. (See *Oleum Fœniculi.*) They contain also fixed oil. Neumann obtained 20 parts of the former, and 120 of the latter, from 960 parts of the seeds.

Medical Properties and Uses. Fennel-seed is among our most grateful aromatics, and in this country is much employed as a carminative, and as a corrigent of other less pleasant medicines, particularly senna and rhubarb. It is recommended for these purposes by the absence of any very highly excitant property. The infusion, prepared by introducing two or three drachms of the seeds into a pint of boiling water, is the form usually preferred. The dose of the bruised or powdered seeds is from a scruple to half a drachm. In infantile cases, the infusion is frequently employed as an enema to produce the expulsion of flatus.

Off. Prep. Aqua Fœniculi, *Lond., Dub.;* Confectio Piperis Nigri, *Dub.;* Decoctum Chamæmeli Comp., *Dub.;* Oleum Fœniculi, *U. S., Dub.;* Spiritus Juniperi Comp., *U. S., Lond., Ed., Dub.* W.

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FRASERA. *U.S. Secondary.*

American Columbo.

"Frasera Walteri. Radix. *The root.*" *U. S.*

Frasera. *Sex. Syst.* Tetrandria Monogynia.—*Nat. Ord.* Gentianeæ.

Gen. Ch. *Calyx* deeply four-parted. *Corolla* four-parted, spreading; segments oval, with a bearded, orbicular gland in the middle of each. *Capsule* compressed, partly marginated, one-celled. *Seeds* few, imbricated, large, elliptical, with a membranaceous margin. *Nuttall.*

Frasera Walteri. Michaux, *Flor. Bor. Americ.* i. 96; *Med. Bot.* ii. 103. —*F. Carolinensis.* Walter. This is one of our most elegant indigenous plants, and the only one of its genus hitherto discovered. From the root, which is triennial, long, spindleshaped, horizontal, fleshy, and of a yellow colour, a strong, succulent, solid, smooth stem rises, from five to ten feet in height. The leaves are sessile, entire, glabrous, of a deep green colour, and disposed in whorls, which commence at the root, and ascend to the summit with successively diminishing intervals. The radical leaves, from five to twelve in number, are elliptical, obtuse, a foot or more in length by about four inches in breadth, and lie upon the ground in the form of a star. Those constituting the whorls upon the stem are successively smaller as they ascend—the lowest oblong lanceolate, the upper lanceolate and pointed. The flowers are numerous, large, of a yellowish-white colour, and disposed in a beautiful terminal pyramidal panicle, from one to five feet long, the branches of which spring from the axils of the upper leaves. The segments of the calyx are lanceolate, acute, and somewhat shorter than those of the corolla. The filaments are inserted into the base of the corolla between its segments, which they do not equal in length. The anthers are oblong and notched at the base. The germ is oblong ovate, compressed, and gradually tapers into the style, which terminates in a bifid stigma. The fruit is an oval, acuminate, compressed, two-valved, one-celled, yellow capsule, containing from eight to twelve flat, elliptical seeds.

The Frasera flourishes in the southern and western portions of the United States, and in many situations is very abundant, especially in Arkansas and Missouri. It prefers rich woodlands and moist meadows. The period of flowering is from May to July; but the stem and flowers are produced only in the third year, the radical leaves being the only part of the plant which previously appears above ground. From this manner of growth it is inferred, that the root should be collected in the autumn of the second or the spring of the third year. Before being dried, it should be cut into transverse slices.

As usually found in the market, frasera is in pieces irregularly circular, an eighth of an inch or more in thickness, about an inch in diameter, somewhat shrunk in the middle, consisting of a central medullary matter and an exterior cortical portion, of a yellowish colour on the cut surfaces, with a light reddish-brown epidermis. In appearance these pieces bear some resemblance to columbo, but may be easily distinguished by the greater uniformity of their internal structure, the absence of concentric and radiating lines, and their purer yellow colour without a greenish tinge. Their taste is bitter and sweetish. Water and diluted alcohol extract their virtues, and the tincture throws down a precipitate upon the addition of water, but is not disturbed by tincture of galls; thus affording additional means of distinguishing the root from columbo.

Medical Properties and Uses. Frasera is a mild tonic, calculated to meet the same indications with the other simple bitters. It has been thought to resemble columbo in medical properties as well as in appearance, and hence has received the popular name of *American columbo;* but experience has not confirmed the high estimate which was at one time formed of its virtues; and though occasionally employed in some parts of the country, it has failed to supplant the tonic of Mozambique. It may be given in powder or infusion. The dose of the former is from thirty grains to a drachm, that of an infusion, made in the proportion of an ounce of the bruised root to a pint of boiling water, is one or two fluidounces, to be repeated several times a day.

The fresh root is said to operate as an emetic and cathartic, and is sometimes given with a view to the latter effect. W.

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FUCUS. *Lond.*

Sea-wrack. Bladder-wrack.

"Fucus vesiculosus." *Lond.*

Off. Syn. FUCUS VESICULOSUS. Herba cum fructu. *Dub.*

Fucus. *Sex. Syst.* Cryptogamia Algæ.—*Nat. Ord.* Algæ.

Gen. Ch. Male. *Vesicles* smooth, hollow, with villose hairs within, interwoven. Female. *Vesicles* smooth, filled with jelly, sprinkled with immersed grains, prominent at the tip. *Seeds* solitary. *Thomson's Dispensatory.*

Fucus Vesiculosus. Turner's *Fuci.* ii. 44. This sea-weed is perennial, with the frond or leaf flat, smooth and glossy, from one to four feet high, from half an inch to an inch and a half broad, furnished with a midrib throughout its length, dichotomous, entire upon the margin, and of a dark olive-green colour. Small spherical vesicles, filled with air, are immersed in the frond near the midrib. The fruit consists of roundish, compressed receptacles, at the ends of the branches, filled with a clear tasteless mucus. The plant grows upon the shores of Europe and of this continent, attaching itself to the rocks by its expanded woody root. On the coast of Scotland and of France, it is much used in the preparation of kelp. It is also employed as a manure, and is mixed with the fodder of cattle.

It has a peculiar odour, and a nauseous saline taste. Several chemists have undertaken its analysis, but the results are by no means satisfactory. It contains a large quantity of soda in saline combination, and iodine according to Gaultier de Claubry, in the state of hydriodate of potassa. These ingredients remain in its ashes, and in the charcoal resulting from its exposure to heat in close vessels.

Medical Properties, &c. The charcoal of this plant has long had the reputation of a deobstruent, and been given in goitre and scrofulous swellings. Its virtues were formerly ascribed chiefly to the carbonate of soda, in which it abounds; but since the discovery of the medical properties of iodine, this has been considered as its most active ingredient. The mucus contained in the vesicles was applied externally, with advantage, by Dr. Russel, as a resolvent in scrofulous tumours.

Other species of Fucus are in all probability possessed of similar properties. Many of them contain a gelatinous matter, and a saccharine principle analogous to mannite; and some are used as aliment in times of scarcity by the wretched inhabitants of the coasts where they are collected. The *F. Helminthocorton* has some reputation in Europe as an anthelmintic. It is used in the form of decoction. W.

GALBANUM. *U.S.*

Galbanum.

"Bubon galbanum. Succus concretus. *The concrete juice.*" *U.S.*

Off. Syn. GALBANI GUMMI-RESINA. Bubon Galbanum. Gummi-resina. *Lond.;* BUBONIS GALBANI GUMMI-RESINA. *Ed.;* GALBANUM. BUBON GALBANUM. Gummi-resina. *Dub.*

Galbanum, *Fr.;* Mutterharz, *Germ.;* Galbano, *Ital., Span.*

GALBANUM. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferæ.

Gen. Ch. *Fruit* ovate, striated, villose. *Willd.*

Bubon Galbanum. Willd. *Sp. Plant.* i. 1439; Woodv. *Med. Bot.* p. 98. t. 40.—*Selinum Galbanum.* Sprengel. This species of Bubon is an undershrub, several feet in height, with a stem which is ligneous towards the base, but in the upper part, jointed, branching, leafy, and covered with a glaucous exudation. The lower leaves are nearly tripinnate, and stand upon footstalks which embrace the stem; the uppermost are almost simple, three-lobed, irregularly serrated, but entire near the base, thickish, and of a sea-green colour. The flowers are yellow and arranged in terminal umbels, of which the principal is plano-convex, and surmounts the main stem. The involucres and involucels are composed of numerous simple, narrow, lance-shaped leaflets. Each flower is followed by two brownish, oval, striated seeds with membranous borders. The plant grows on the eastern coast of Africa, from Nubia to the Cape of Good Hope, and is said also to be a native of Syria. It is at present, however, denied that this is the true galbanum plant, which is considered by Mr. Don as forming a new genus allied to Siler, and for which he proposes the name of *Galbanum officinale.* (*Trans. Lin. Soc.* xvi. 603.) Galbanum is obtained from it by making incisions into the stem, or cutting it off a short distance above the root. A cream-coloured juice exudes, which concretes upon exposure to the air. A small portion of juice also exudes spontaneously from the joints, and hardens in the shape of tears. The drug is brought from the Levant.

Properties. The form in which galbanum usually appears is that of masses, composed of whitish, reddish, or yellowish tears, irregularly agglutinated by a darker coloured substance, more or less translucent, and generally mixed with pieces of stalk, seeds, or other foreign matters. It is also found, though very rarely if at all in our markets, in the state of separate tears, of a yellowish-white colour, shining externally as if varnished, and of an oily aspect. Galbanum has in cool weather the consistence of firm wax; but softens in summer, and by the heat of the hand is rendered ductile and adhesive. At the temperature of boiling water it is sufficiently liquid to admit of being strained. A dark brown or blackish colour, a consistence always soft, the absence of whitish grains, and the intermixture of earthy impurities, are signs of inferiority.

The odour of galbanum is peculiar and disagreeable, but not alliaceous like that of sagapenum. Its taste is bitterish, warm, and acrid. Its specific gravity is 1.212. When triturated with water it forms an imperfect milky solution, which upon standing deposites the greater portion of what was taken up. Wine and vinegar act upon it in a similar manner. Alcohol dissolves a considerable proportion, forming a yellow tincture, which has the smell and taste of galbanum, and becomes milky by the addition of water, but affords no precipitate. In dilute alcohol it is wholly soluble, with the exception of impurities. One hundred parts of it yielded to M. Pelletier, 66.86 parts of resin, 19.28 of gum, 6.34 of volatile oil including the loss, 7.52 of wood and impurities, with traces of the supermalate of lime. It is, therefore, entitled to rank with the *gum-resins.* By distillation at the temperature of about 250° F., the essential oil is obtained of a fine indigo blue colour which it imparts to alcohol. Procured by distillation with water, it is colourless, and becomes yellowish by age. It is lighter than water.

Medical Properties and Uses. Galbanum is stimulant, expectorant, and antispasmodic; and may be considered as intermediate in power between ammoniac and assafetida. It is, however, much less employed than either of these gum-resins, and in the United States is seldom or never prescribed internally. The complaints to which it was formerly thought applicable, were chiefly chronic affections of the bronchial mucous membrane, amenorrhœa, and chronic rheumatism. It is occasionally applied externally in the shape of plaster to indolent swellings, with the view of promoting resolution or suppuration. Galbanum was known to the ancients. The dose is from ten to twenty grains, and may be given in pill, or triturated with gum Arabic, sugar, and water, so as to form an emulsion.

Off. Prep. Emplastrum Assæfœtidæ, *Ed.;* Emplastrum Galbani, *Dub.;* Emplastrum Galbani Compositum, *U.S., Lond.;* Emplastrum Gummosum, *Ed.;* Pil. Assæfœtid. Comp., *Ed.;* Pil. Galban. Comp., *Lond., Dub.;* Tinctura Galbani, *Dub.* W.

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GALLA. *U.S.*

Galls.

"Quercus infectoria. Cyniphis nidus." *The nest of the Cynips quercûs folii." U.S.*

Off. Syn. GALLÆ. Cynips quercûs folii. Nidus. *Lond.;* GALLA. *Ex variis quercûs speciebus. Ed.;* GALLÆ. QUERCUS INFECTORIA. *Dub.*

Noix de galle, *Fr.;* Galläpfel, *Germ.;* Galla, *Ital.;* Agallas de Levante, *Span.*

Many vegetables, when pierced by certain insects, particularly those of the genus *Cynips,* are affected at the points of puncture with a morbid action, resulting in the production of excrescences, which, as they are derived from the proper juices of the plant, partake more or less of its predominant chemical character. Most species of oak are susceptible of this kind of action; and the resulting excrescences, having in a high degree the astringency of the plant on which they grow, have been employed for various practical purposes. They are known by the name of *galls*, a term which, as well as their employment in medicine, has been handed down to us from the ancients. The *Quercus infectoria*, *Q. Ægilops*, *Q. excelsa*, *Q. Ilex*, *Q. Cerris*, and *Q. Robur*, have all been particularized as occasionally affording this product; but it is now generally admitted, upon the authority of Olivier, that the officinal galls are derived chiefly, if not exclusively, from the *Q. infectoria*, and this is recognised as their source in the Pharmacopœias of the United States and of Dublin.

QUERCUS. See QUERCUS ALBA.

Q. infectoria. Willd. *Sp. Plant.* iv. 436; Olivier, *Voy, Or.* t. 14 *et* 15. The *dyers' oak* is a small tree or shrub, with a crooked stem, seldom exceeding six feet in height. The leaves are obtusely toothed, smooth, of a bright green colour on both sides, and stand on short footstalks. The acorn is elongated, smooth, two or three times longer than the cup, which is sessile, somewhat downy, and scaly. This species of Quercus grows, according to Olivier, throughout Asia Minor, from the Archipelago to the confines of Persia. Captain M. Kinneir found it also in Armenia and Kurdistan; General Hardwicke observed it growing in the neighbourhood of Adwanie; and it probably pervades the middle latitudes of Asia.

The gall originates from the puncture of the *Cynips quercûsfolii* of Linnæus, the *Dioplepsis gallæ tinctoriæ* of Geoffroy, a hymenopterous insect or fly, with a fawn-coloured body, dark antennæ, and upper part of its abdomen shining brown. The insect pierces the shoots of the young boughs, and deposites its egg in the wound. This irritates the vessels of the part, and a small tumour very speedily rises, which appears to be the result of a morbid secretion, and upon examination by the microscope exhibits no signs of proper vegetable fibre. The egg grows with the gall, and is soon converted into a larva, which feeds upon the vegetable matter by which it is surrounded, and thus forms a cavity in the centre of the tumour. The insect at length assumes the form of a fly, and escapes by eating its way out of the nut. The galls are in perfection when they have attained their full size, and before the egg has been hatched, or the fly has escaped. Collected at this period, they are called, from their dark colour, *blue*, or *green*, or *black galls*, and are most highly esteemed. Those which are gathered later, and which have been injured by the insect, are called *white galls*. They are usually larger, less heavy and compact, and of a lighter colour than the former; and are considered much inferior.

The galls collected in Syria and Asia Minor are brought to this country chiefly from the ports of Smyrna and Trieste. As they are produced abundantly in the vicinity of Aleppo, it has been customary to designate them by the name of that city; though the designation, however correct it may formerly have been, is now wholly inapplicable, as they are obtained from many other places; and the produce of different parts of Asiatic Turkey is not capable of being discriminated, at least in our markets. We have been informed, that, within a few years, great quantities of galls very closely resembling those from the Mediterranean have been brought to the United States from Calcutta. Whether they are the product of Hindostan, or taken thither from other countries, we are unable to decide with certainty. Ainslie is inclined to think that most of the galls found in the markets of India are imported from Persia by the Arab merchants. We are, nevertheless, informed that they are among the products of Moultan; and it is highly probable that they grow upon some of the other astringent vegetables, besides the oak, which flourish in Hindostan.

The galls of France and other southern countries of Europe have a smooth, shining, reddish surface, are little esteemed, and are seldom brought to the United States.

A species of nut was not many years since commonly sold in our markets, and is still found in some of the shops, under the name of *white galls*, to which, however, it bears not the slightest resemblance either in appearance or structure. It consists of an outer shell enclosing a hard kernel, is an inch or more in length, thick in the middle, somewhat pointed at both extremities, of a dull white or brownish colour, and is probably a species of *myrobalans*. To the taste it is powerfully astringent.

Properties. Galls are nearly round, from the size of a pea to that of a very large cherry, with a surface usually studded with small tuberosities, in the intervals of which it is smooth. The best are externally of a bluish or lead colour, internally whitish or brownish, hard, solid, brittle, with a flinty fracture, a striated texture, and a small spot or cavity in the centre, indicating the presence of the undeveloped or decayed insect. Their powder has some shade of gray. Those of an inferior quality are of a lighter colour, sometimes reddish or nearly white, of a loose texture, with a large cavity in the centre, communicating externally by a small hole through which the fly has escaped. Galls are inodorous, and have a bitter very astringent taste. From 500 parts Sir H. Davy obtained 185 parts of matter soluble in water, of which, according to his analysis, 130 were tannin, 31 gallic acid with a little extractive, 12 mucilage and matter rendered insoluble by evaporation, and 12 saline matter and calcareous earth. Other chemists have found a larger proportion of tannin and gallic acid. Braconnot discovered the presence of a small quantity of another acid, to which he gave the name *ellagic*, derived from *galle*, the French name for galls, by reversing the order of the letters. According to M. Pelouse, however, neither gallic nor ellagic acid preexists in galls, being formed by the reaction of the atmospheric oxygen upon their tannin. (*Journ. de Pharm.* xx. 359.) Galls also yielded to Professor Branchi, by distillation with water, a concrete volatile oil. All their soluble matter is taken up by forty times their weight of boiling water, and the residue is tasteless: alcohol dissolves seven parts in ten, ether five parts. (*Thomson's Dispensatory.*) A saturated decoction of galls deposites upon cooling a copious pale yellow precipitate. The infusion or tincture affords precipitates with sulphuric and muriatic acids, lime-water, carbonate of ammonia, and carbonate of potassa; with solutions of acetate and sub-acetate of lead, the sulphates of copper and iron, the nitrates of silver and mercury, and tartrate of antimony and potassa; with the infusions of Peruvian bark, columbo, opium, and many other vegetables, especially those containing proximate alkaline principles, with most of which gallic acid or tannin forms insoluble compounds. The solution of gelatin also produces a precipitate. The infusion of galls reddens litmus paper, is rendered orange by nitric acid, milky by the corrosive chloride of mercury, and has its own colour deepened by ammonia; but throws down no precipitate with either of these reagents. Sulphate of zinc is said by Dr. A. T. Thomson to occasion a slow precipitate, but this result was not obtained by Dr. Duncan.

Medical Properties and Uses. As might be inferred from the quantity of tannin they contain, galls are powerfully astringent. They are little employed as an internal remedy, though occasionally prescribed in chronic diarrhœa. In the form of infusion or decoction they may be advantageously used as an astringent gargle, lotion, or injection; and, mixed with simple ointment, in the proportion of one part of galls, in very fine powder, to eight parts of the unguent, they are frequently applied to the anus and rectum in hemorrhoidal affections. The dose of powdered galls is from ten to twenty grains, to be repeated several times a day.

Off. Prep. Tinctura Gallarum, *Ed., Dub.;* Unguentum Gallæ, *U.S., Ed., Dub.*

W.

GAMBOGIA. *U.S.*

Gamboge.

"Stalagmitis cambogioides. Succus concretus. *The concrete juice.*" *U.S.*

Off. Syn. CAMBOGIA. Stalagmitis Cambogioides. Gummi-resina. *Lond.;* GAMBOGIA. Gummi resina ex Stalagmitide Cambogioide et quibusdam aliis, *Ed.;* GAMBOGIA. STALAGMITIS CAMBOGIA. *Dub.*

Gomme gutte, *Fr.;* Gummigutt, *Germ.;* Gomma-gotta, *Ital.;* Guta gamba, *Span.*

Several plants belonging to the natural family of the *Guttiferæ*, growing in the equatorial regions, yield on incision a yellow opaque juice, which hardens on exposure to the air, and bears a close resemblance to gamboge; but it is not certainly known from which of these plants the officinal gum-resin is procured. Persoon, De Candolle, Richard, and others, refer it to the *Garcinia Cambogia*—the *Cambogia Gutta* of Linnæus—while the majority of writers agree with Kœnig, in considering it the product of the *Stalagmitis Cambogioides* of Murray; and the latter is recognised by the American and all the British Pharmacopœias. Dr. White, who was well acquainted with the *Garcinia Cambogia*, asserts that its concrete juice is not the gamboge of commerce; and we are informed by Dr. Duncan, that a specimen of the yellow juice of the *Stalagmitis* which he received from India has not the properties of that drug. Ainslie states that a forest tree has been found in Malabar and Canara, which yields a juice in all respects identical with gamboge; but it has not been botanically described; and its product has not been brought into the market. On the whole, it must be admitted that we are uncertain, not only as to the precise tree which affords the officinal gamboge, but also whether it is derived from any one tree exclusively, or from several. In this uncertainty, it seems hardly necessary to crowd our pages with botanical descriptions, which may possibly have no relation to the subject.

Gamboge is collected in Siam and Cochin-china. It is said also to be produced in Ceylon, where the *Stalagmitis Cambogioides* grows; but it is doubtful whether any of the drug, as found in commerce, is derived from this island. Milburn does not mention it among the exports. The tree from which it is obtained in Siam has not been examined by any botanist. The mode of procuring it is to break off the leaves and young shoots, from which the juice issues in drops, and being received in suitable vessels gradually thickens, and at length becomes solid. When it has attained the requisite consistence it is rolled into cylinders, and wrapped in leaves. The juice is sometimes received into the hollow joints of the bamboo, which give it a cylindrical form; and as it contracts during the process of solidification, the cylinder is often hollow in the centre. The name *gummi gutta*, by which it is generally known on the continent of Europe, probably originated from the circumstance that the juice escapes from the plant by drops. The officinal title was undoubtedly derived from the province of Cambodia, in which the gum-resin is collected. It was first brought to Europe by the Dutch about the middle of the seventeenth century.

We import gamboge from Canton and Calcutta, whither it is carried by the native or resident merchants. There is no difference in the appearance or character of the drug as brought from these two ports—an evidence that it is originally derived from the same place.

Properties. It is usually in cylindrical rolls, from one to two inches in diameter, sometimes hollow in the centre, often folded double, or agglutinated in masses in which the original form is not always readily distinguishable. The pieces are sometimes flattened. They are externally striated, and of a dull orange colour, which is occasionally displaced by greenish stains, or concealed by the bright yellow powder of the drug, which slightly adheres to the surface. Gamboge is brittle, with a smooth, conchoidal, shining fracture; and the fragments are slightly translucent at their edges. The colour of the mass when broken is a uniform deep orange-yellow, which becomes a beautiful bright yellow in the powder, or when the surface is rubbed with water. From the brilliance of its colour, gamboge is highly esteemed as a pigment. In the inferior kinds the tint is duller and less uniform. It has no smell, and little taste; but after remaining a short time in the mouth produces an acrid sensation in the fauces. Its sp. gr. is 1.221. Exposed to heat it burns with a white flame, emitting much smoke, and leaving a light spongy charcoal. It is a gum-resin, and, unlike most other substances of the same class, contains no essential oil. In 100 parts of it Braconnot found 19.5 parts of gum, 0.5 of impurities, and 80 of a red, insipid, transparent resinous substance, becoming yellow by pulverization, and supposed to consist of resin united with a yellow colouring principle. John obtained 10.5 per cent. of gum, 89 of resin, and 0.5 of impurities. Gamboge is readily and entirely diffusible in water, forming a yellow opaque emulsion, from which the resinous matter is very slowly deposited. It is almost entirely dissolved by alcohol; and a golden yellow tincture results, which is rendered opaque and bright yellow by the addition of water. Its solution in ammoniated alcohol is not disturbed by water. It is wholly taken up by alkaline solutions, from which it is partially precipitated by the acids. The strong acids dissolve it; but the solution when diluted with water deposites a yellow precipitate.

Medical Properties and Uses. Gamboge is a powerful, drastic, hydragogue cathartic, very apt to produce nausea and vomiting when given in the full dose. It is much employed in the treatment of dropsy attended with torpid bowels, generally in combination with the supertartrate of potassa or jalap. It is also prescribed in cases of obstinate constipation, and has frequently been found effectual in the expulsion of the tapeworm. It is often combined with other and milder cathartics, the action of which it promotes and accelerates, while its own is moderated. The full dose is from two to six grains, which in cases of tænia has been raised to ten or fifteen grains. As it is apt to occasion much sickness and griping, the best plan, under ordinary circumstances, is to give it in small doses repeated at short intervals till it operates. It may be given in pill or emulsion, or dissolved in an alkaline solution. The last method of administration has been recommended in dropsical complaints.

Off. Prep. Pilulæ Catharticæ Compositæ, *U. S.;* Pilulæ Cambogiæ Compositæ, *Lond.*, *Ed.*, *Dub.* W.

GAULTHERIA. *U. S.*

Partridge-berry.

"Gaultheria procumbens. Folia. *The leaves.*" *U. S.*

GAULTHERIA. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Ericeæ.

Gen. Ch. Calyx five-cleft, bibracteate at the base. *Corolla* ovate. *Capsule* five-celled, invested with the berried calyx. *Pursh.*

Gaultheria procumbens. Willd. *Sp. Plant.* ii. 616; Bigelow, *Am. Med. Bot.* ii. 27; Barton, *Med. Bot.* i. 171. This is a small, indigenous, shrubby, evergreen plant, with a long, creeping, horizontal root, which sends up at intervals one and sometimes two erect, slender, round, reddish stems. These are naked below, leafy at the summit, and usually less than a span in height. The leaves are ovate or obovate, acute, revolute at the edges with a few mucronate serratures, coriaceous, shining, bright green upon the upper surface, paler beneath, of unequal size, and supported irregularly on short red petioles. The flowers, of which not more than from three to five are usually found upon each stem, stand on curved, drooping, axillary peduncles. The calyx is white, five-toothed, and furnished at its base with two concave cordate bractes, which are by some authors described as an outer calyx. The corolla is white, ovate or urceolate, contracted at its mouth, and divided at its border into five small acute segments. The stamens consist of curved, plumose filaments, and oblong orange-coloured anthers, opening on the outside. The germ, which rests upon a ring having ten teeth alternating with the ten stamens, is roundish, depressed, and surmounted by an erect filiform style, terminating in an obtuse stigma. The fruit is a small, five-celled, many-seeded capsule, enclosed in a fleshy covering, formed by the enlarged calyx, and presenting the appearance of a bright scarlet berry.

The plant extends from Canada to Georgia, growing in large beds in mountainous tracts, or in dry barrens and sandy plains, beneath the shade of shrubs and trees, particularly of other evergreens, as the Kalmiæ and Rhododendra. It is abundant in the pine barrens of New Jersey. In different parts of the country it is known by the various names of *partridge-berry*, *deer-berry*, *tea-berry*, and *mountain tea.* The flowers appear from May to September, and the fruit ripens at corresponding periods. Though the leaves only are officinal, all parts of the plant are endowed with the peculiar flavour for which these are employed, and which is found in several other plants, particularly in the bark of the *Betula lenta* or sweet birch. The fruit possesses it in a high degree, and being at the same time sweetish, is much relished by some persons, and forms a favourite article of food with partridges, deer, and other wild animals.

To the very peculiar and agreeably aromatic odour and taste which belong to the whole plant, the leaves add a marked astringency, dependent on the presence of tannin. The aromatic properties reside in a volatile oil, which may be separated by distillation. (See *Oleum Gaultheriæ.*)

Medical Properties and Uses. Gaultheria has the usual stimulant operation of the aromatics, united with astringency; and may, therefore, be used with advantage in some forms of chronic diarrhœa. Like other substances of the same class, it has been employed as an emmenagogue, and with the view of increasing the secretion of milk; but its chief use is to impart an agreeable flavour to mixtures and other preparations. It may be conveniently administered in the form of infusion, which in some parts of the country is not unfrequently used at the table as a substitute for common tea. The oil, however, is more used in regular practice than the leaves. Instances of death are on record, resulting from the use of the oil, by mistake, in the quantity of about a fluidounce. On examination after death, strong marks of inflammation of the stomach were discovered. (*Journ. of Phil. Col. of Pharm.* vi. 290.)

Off. Prep. Oleum Gaultheriæ. *U. S.* W.

◆

GENTIANA. *U.S.*

Gentian.

"Gentiana lutea. Radix. *The root.*" *U. S.*

Off. Syn. GENTIANÆ RADIX. Gentiana lutea. Radix. *Lond.*; GENTIANÆ LUTEÆ RADIX. *Ed.*; GENTIANA LUTEA. Radix. *Dub.*

Gentiane jaune, *Fr.*; Rother Enzian, *Germ.*; Genziana, *Ital.*; Genciana, *Span.*

Gentiana. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Gentianeæ.

Gen. Ch. *Corolla* one-petalled. *Capsule* two-valved, one-celled, with two longitudinal receptacles. *Willd.*

This genus is not constant in the number of the stamens. Some species have five stamens and a five-cleft corolla; others have only four stamens and a four-cleft corolla; others again have more than five. But the plants have so strong an affinity in their general characters, and are so uniform in the structure of the fruit, that they continue to be associated together by botanists, notwithstanding the discrepancies alluded to.

Gentiana lutea. Willd. *Sp. Plant.* i. 1331; *Woodv. Med. Bot.* p. 273. t. 95. Yellow gentian is among the most remarkable of the species which compose this genus, both for its beauty, and its great comparative size. From its thick, long, branching, perennial root, an erect, round stem rises to the height of three or four feet, bearing opposite, sessile, oval, acute, five-nerved leaves, of a bright green colour, and somewhate glaucous. The lower leaves, which spring from the root, are narrowed at their base into the form of a petiole. The flowers are large and beautiful, of a yellow colour, peduncled, and placed in whorls at the axils of the upper leaves. The calyx is a membranous deciduous spathe; the corolla is rotate, and deeply divided into five lanceolate, acute segments.

This plant grows among the Appenines, the Alps, the Pyrenees, and in other mountainous or elevated regions of Europe. Its root is the only part used in medicine.

Several other species of the genus possess analogous medicinal properties, and are used for similar purposes. The roots of the *G. biloba* of De Candolle, and *G. punctata* of Linnæus, are said to be frequently mingled with the officinal gentian, from which they are scarcely distinguishable. The *G. purpurea* of Linnæus is much used in Norway and Germany, where it grows, and is considered quite equal to the *G. lutea.* The *G. macrophylla* of Pallas is used in Siberia; the *G. Chirayita* of Roxburgh in Bengal; and one indigenous species, the *G. Catesbæi*, has found a place in the secondary catalogue of the U. S. Pharmacopœia.

Gentian is imported from Germany.

Properties. As found in our shops, it is in pieces of various dimensions and shape, usually of considerable length, consisting sometimes of longitudinal slices, sometimes of the root cut transversely, twisted, wrinkled externally, of a grayish-brown colour on the outside, yellowish or reddish within, and of a soft spongy texture. The odour is feeble, but decided and peculiar. The taste is slightly sweetish, and intensely bitter, without being nauseous. The powder is of a yellowish colour. Water and alcohol extract the taste and medical virtues of the root. Examined by MM. Henry and Caventou, it was found to contain, 1. a peculiar principle called *gentianin*, 2. a volatile odorous principle, 3. a substance identical with bird-lime (*glu*), 4. a greenish fixed oil, 5. a free organic acid, 6. uncrystallizable sugar, 7. gum, 8. yellow colouring matter, and 9. lignin. *Gentianin*, which is probably the chief active ingredient of the root, is a yellow, crystallizable, neutral principle, without smell, with the bitterness of gentian, very soluble in ether and alcohol, slightly soluble in cold water, more so in hot water, partly volatilizable by heat, partly decomposed, with the evolution of products which indicate the presence of nitrogen in its composition. It is obtained by macerating the root in ether, decanting and evaporating the ethereal tincture, treating the residue with alcohol of 0.83 which leaves behind a viscid substance dissolved by the ether (*glu*), evaporating the alcoholic solution, and treating the residue with dilute alcohol, which, leaving a green fixed oil, dissolves the gentianin, and upon evaporation yields it in a crystalline state, though still impure. To procure it pure, the alcoholic solution is to be evaporated to dryness, and the residue boiled with a little water and recently calcined magnesia, which neutralizes some free acid present, while the volatile odorous principle is driven off by the heat. If the mass be now dried and submitted to the action of ether, perfectly pure gentianin is dissolved, and is obtained in needle-shaped crystals upon the evaporation of the ether. When gentian is macerated in cold water, it undergoes the vinous fermentation, in consequence, probably, of the presence of its saccharine and mucilaginous principles. From the fermented infusion a spirituous liquor is obtained by distillation, which, though bitter, and unpleasant to the smell, is much relished by the Swiss and Tyrolese.

Medical Properties and Uses. Gentian possesses, in a high degree, the tonic powers which characterize the simple bitters. It excites the appetite, invigorates the powers of digestion, moderately increases the temperature of the body and the force of the circulation, and acts in fact as a general corroborant of the system. In very large doses, however, it is apt to load and oppress the stomach, to irritate the bowels, and even to occasion nausea and vomiting. It has been known as a medicine from the highest antiquity, and is said to have derived its name from Gentius, a king of Illyria. Many of the complex preparations handed down from the Greeks and Arabians contain it among their ingredients; and it enters into most of the stomachic combinations employed in modern practice. It may be used in all cases of disease dependent on pure debility of the digestive organs, or requiring a general tonic impression. Dyspepsia, gout, amenorrhœa, hysteria, scrofula, intermittent fever, diarrhœa, worms, are among the many forms of disease in which it has proved useful; but it is the condition of the stomach and of the system generally, not the name of the disease, which must be taken into consideration in prescribing it, and there is scarcely a single complaint in which it can be advantageously administered under all circumstances. Its powder has been applied externally to malignant and sloughing ulcers. It is usually given in the form of infusion or tincture. The dose of the powder is from ten to forty grains.

Off. Prep. Extractum Gentianæ, *U.S., Lond., Ed., Dub.;* Infusum Gentianæ Compositum, *U.S., Lond., Ed., Dub.;* Tinctura Gentianæ, *U.S., Lond., Ed., Dub.;* Tinctura Rhei et Gentianæ, *U.S.;* Vinum Gentianæ Compositum, *U.S., Ed.* W.

GENTIANA CATESBÆI. *U.S. Secondary.*

Blue Gentian.

"Gentiana Catesbæi. Radix. *The root.*" *U.S.*

Gentiana. See GENTIANA.

Several indigenous species of gentian approach more or less nearly to the *Gentiana lutea* in the bitterness and medicinal virtues of their roots; but the *G. Catesbæi*, which resembles it most closely in these respects, is the only one which has attracted the particular attention of the medical profession.

Gentiana Catesbæi. Walter, *Flor. Car.* 109; Bigelow, *Med. Bot.* ii. 137; Nuttall, *Gen. of Am. Plants*, i. 172. The blue gentian has a perennial, branching, somewhat fleshy root, and a simple, erect, rough stem, rising eight or ten inches in height, and bearing opposite leaves, which are ovate lanceolate, acute, and rough on their margin. The flowers, which are of a palish-blue colour, are crowded, nearly sessile, axillary and terminal. The divisions of the calyx are linear lanceolate, and longer than the tube. The corolla is large, ventricose, plaited, and divided at its border into ten segments, of which the five outer are more or less acute, the five inner bifid and fringed. The number of stamens is five, and the two stigmas are seated on the germ. The capsule is oblong, acuminate, with two valves, and a single cell.

The *G. Catesbæi* grows in the grassy swamps of North and South Carolina, where it flowers from September to December. It was named by Walter and Elliott in honour of Catesby, by whom it was imperfectly delineated upwards of seventy years ago. Pursh confounds it with the *G. saponaria*, to which it is nearly allied.

Properties. By Dr. Bigelow we are told that the dried root of this plant has at first a mucilaginous and sweetish taste, which is soon succeeded by an intense bitterness, approaching nearly to that of the officinal gentian. Alcohol and boiling water extract its virtues, and the tincture and decoction are even more bitter than the root in substance. Blue gentian has not been satisfactorily analyzed.

Medical Properties. As a medicine it is little inferior to the European gentian, and may be employed for similar purposes. In the Northern and Middle States it is not used; but it is said to be occasionally prescribed by the practitioners of the South in dyspepsia, and other cases of stomachic and general debility. It may be given in powder in the dose of fifteen or thirty grains, and may be substituted for the foreign gentian in the preparation of the officinal extract, infusion, wine, and tincture. W.

GEOFFRÆÆ INERMIS CORTEX. *Ed.*

Cabbage-tree Bark.

Off. Syn. GEOFFROYA INERMIS. Cortex. *Dub.*

Geoffroya de Jamaique, *Fr.;* Jamaicanische Wurmrinde, *Germ.;* Geoffrœa, *Ital.*

GEOFFROYA. *Sex. Syst.* Diadelphia Decandria.—*Nat. Ord.* Leguminosæ.

Gen. Ch. *Calyx* five-cleft. *Drupe* ovate. *Nucleus* compressed. *Willd.*

Several species have by some botanists been separated from the Geoffroya, and erected into a new genus with the title *Andira.* The distinctive character of the latter is a papilionaceous corolla and leguminous fruit, while in the true Geoffroya the corolla is not papilionaceous, and the fruit is a kind of drupe. The cabbage-tree is ranked among the *Andiræ.*

Geoffroya inermis. Willd. *Sp. Plant.* iii. 1130; Woodv. *Med. Bot.* p. 416. t. 151.—*Andira inermis*, Humb. and Bonp. *Nov. Gen. Amer.* The stem of this tree, which rises to a considerable height, is branched towards the top, and covered with a smooth gray bark. The leaves are pinnate, consisting of several pairs of lanceolate, pointed, veined, smooth, petiolate leaflets, with an odd one at the end. The flowers are rose-coloured, and appear in clusters upon large branched spikes. The cabbage-tree is a native of Jamaica and other West India islands. The bark is the part used.

On the continent of Europe the bark of the *G. Surinamensis*, the *Andira retusa* of Humb. and Bonp., which grows in Surinam, is also officinal. It is considered more powerfully vermifuge, without being equally liable to produce injurious effects.

Cabbage-tree bark is in long pieces, thick, fibrous, externally of a brownish-ash colour, scaly and covered with lichens, internally yellowish, of a resinous fracture, a disagreeable smell, a sweetish, mucilaginous, bitterish taste, and affording a powder resembling that of jalap.

The bark of the *G. Surinamensis* has a grayish epidermis, beneath which it is reddish-brown, laminated, compact, very tenacious, and when cut transversely exhibits a shining and variegated surface. In the dried state it is inodorous, but has an austere bitter taste. The powder is of a pale cinnamon colour.

Medical Properties and Uses. Cabbage-tree bark is cathartic, and in large doses is apt to occasion vomiting, fever, and delirium. It is said that these effects are more liable to result if cold water is drank during its operation, and are relieved by the use of warm water, castor oil, or a vegetable acid. In the West Indies the bark is esteemed a powerful vermifuge, and is much employed for expelling lumbrici; but it is dangerous if incautiously administered, and instances of death from its use have occurred. It is almost unknown in this country, and does not enter into our officinal catalogues. The usual form of administration is that of decoction, though the medicine is also given in powder, syrup, and extract. The dose of the powder is from a scruple to half a drachm, of the extract three grains, of the decoction two fluidounces.

Off. Prep. Decoctum Geoffrææ Inermis, *Ed., Dub.* W.

GERANIUM. *U.S.*

Cranesbill.

"Geranium maculatum. Radix. *The root.*" *U.S.*

Geranium. *Sex. Syst.* Monadelphia Decandria.—*Nat. Ord.* Geraniaceæ.

Gen. Ch. *Calyx* five-leaved. *Corolla* five-petalled, regular. *Nectary* five melliferous glands united to the base of the longer filaments. *Arilli* five, one-seeded, awned, at the base of a beaked receptacle; awns simple, naked, neither spiral nor bearded. *Willd.*

Geranium maculatum. Willd. *Sp. Plant.* iii. 705; Bigelow, *Am. Med. Bot.* i. 84; Barton, *Med. Bot.* i. 149. This plant has a perennial, horizontal, fleshy root, which is furnished with short fibres, and sends up annually an herbaceous stem, with several radical leaves. The stem is erect, round, dichotomously branched, from one to two feet high, of a grayish-green colour, and thickly covered, in common with the petioles and peduncles, with reflexed hairs. The leaves are deeply divided into three, five, or seven lobes, which are variously incised at their extremities, hairy, and of a pale green colour, mottled with still paler spots. Those which rise immediately from the root are supported on footstalks eight or ten inches long; those of the stem are opposite, the lower petiolate, the upper nearly sessile, with lanceolate or linear stipules. The flowers are large, and usually of a purple colour. The peduncles spring from the forks of the stem, and severally support two flowers upon short pedicels. The calyx is composed of five oblong, ribbed, cuspidate leaves; the petals are five, obovate, and entire; the stamens ten, with oblong deciduous anthers, the five alternate filaments being longer than the others, and having glands at their base; the germ is ovate, supporting a straight style as long as the stamens, and surmounted by five stigmas. The fruit consists of five aggregate, one-seeded capsules, attached by a beak to the persistent style, curling up and scattering the seeds when ripe.

The cranesbill is indigenous, growing throughout the United States, in moist woods, thickets and hedges, and generally in low grounds. It flowers from May to July. The root should be collected in autumn.

This, when dried, is in pieces from one to three inches long, from a quarter to half an inch in thickness, somewhat flattened, contorted, wrinkled, tuberculated, and beset with slender fibres. It is externally of an umber-brown colour, internally reddish-gray, compact, inodorous, and of an astringent taste, without bitterness or other unpleasant flavour. Water and alcohol extract its virtues. Tannin is an abundant constituent.

Medical Properties and Uses. Geranium is one of our most powerful indigenous astringents, and may be employed for all the purposes to which these medicines are applicable. The absence of unpleasant taste and all other offensive qualities, renders it peculiarly serviceable in the cases of infants, or of persons with very delicate stomachs. Diarrhœa, chronic dysentery, cholera infantum in the latter stages, and the various hemorrhages, are the forms of disease in which it is most commonly used and with greatest advantage; but care should be taken, before it is administered, that the condition of the system and of the part affected is such as not to contra-indicate the use of astringents. As an application to indolent ulcers, an injection in gleet and leucorrhœa, a gargle in relaxation of the uvula and aphthous ulcerations of the throat, it answers the same purpose with kino, catechu, and other foreign remedies of similar character. It is a popular domestic remedy in various parts of the United States, and is said to be employed by the Indians in numerous disorders. It may be given in substance, decoction, tincture, or extract. The dose of the powder is twenty or thirty grains, that of a decoction made by boiling an ounce of the root in a pint and a half of water to a pint, from one to two fluidounces. The medicine is sometimes given to children boiled in milk. W.

GEUM. *U. S. Secondary.*

Water Avens.

"Geum rivale. Radix. *The root.*" *U. S.*

Benoite aquatique, *Fr.;* Wiesen-Benediktenwurzel, *Germ.*

GEUM. *Sex. Syst.* Icosandria Polygynia.—*Nat. Ord.* Rosaceæ.

Gen. Ch. Calyx ten-cleft. *Petals* five. *Seeds* with a bent awn. *Willd.*

Several species belonging to this genus have been medicinally employed; but two only are deserving of particular notice, the *Geum rivale,* which has a place in the secondary list of the United States Pharmacopœia, and the *G. urbanum,* recognised by the Dublin College.

Geum rivale. Willd. *Sp. Plant.* ii. 1115; *Engl. Bot.* 106. The water avens has a perennial, horizontal, jointed, scaly, tapering root, about six inches long, of a reddish-brown colour externally, white internally, and furnished with numerous descending yellowish fibres. Sometimes one, sometimes several stems rise from the same root, which also sends up numerous leaves. The stems are about a foot and a half high, simple, erect, pubescent, and of a purplish colour. The radical leaves are interruptedly pinnate, with large terminal leaflets, and stand on long, hairy footstalks; those of the stem are petiolate, and divided into three serrate, pointed segments. The flowers are few, solitary, nodding, yellowish-purple, and supported on axillary and terminal peduncles. The colour of the stems and flowers has given rise to the name of *purple avens,* by which the plant is sometimes called. The calyx is inferior, with ten lanceolate pointed segments, of which the five alternate are smaller than the others. The petals are five, and of the same length as the calyx. The seeds are oval, and furnished with plumose awns, minutely uncinate, and nearly naked at the summit.

This species of Geum is common to Europe and the United States, though the plant of this country has smaller flowers, with petals more rounded on the top, and leaves more deeply incised than the European. It delights in wet boggy meadows, and extends from Canada into New England, New York, and Pennsylvania. Its flowers appear in June and July.

The dried root is hard, brittle, easily pulverized, of a reddish or purplish colour, without smell, and of an astringent, bitterish taste. Boiling water extracts its virtues.

Medical Properties and Uses. Water avens is tonic and powerfully astringent. It may be used with advantage in chronic or passive hemorrhages, leucorrhœa, and diarrhœa; and is said to be beneficially employed, in the Eastern States, as a popular remedy in the debility of phthisis pulmonalis, in simple dyspepsia, and in visceral diseases consequent on disorder of the stomach. In Europe it is sometimes substituted for the root of the *common avens,* or Geum urbanum, but is less esteemed. The dose of the powdered root is from a scruple to a drachm, to be repeated three times a day. The decoction, which is usually preferred, may be made by boiling an ounce of the root in a pint of water, and given in the quantity of one or two fluidounces. A weak decoction is sometimes used by invalids in New England as a substitute for tea and coffee. W.

GEUM URBANUM. Radix. *Dub.*

Root of Avens.

Benoite, *Fr.;* Benediktenwurzel, *Germ.;* Cariofillata, *Ital.;* Cariofilata, *Span.*

GEUM. See GEUM.

Geum urbanum. Willd. *Sp. Plant.* ii. 1113; Woodv. *Med. Bot.* p. 502. t. 181. Avens is an herbaceous perennial plant, with slender, erect, branching, hairy stems, about two feet in height. The leaves are petiolate, serrate, hairy; those on the upper part of the stem, simple, trifid, and pointed; those nearest the root, pinnate and lyrate, with two pairs of unequal leaflets, and a larger terminal leaflet, which is usually three-lobed. The flowers are small, of a bright yellow colour, and solitary upon erect terminal peduncles. The seeds, which are hairy and collected in a roundish head, have at their summit a naked awn, bent like a hook at the apex.

This species of Geum is a native of Europe, where it grows in woods and shady uncultivated places. The flowers appear in June and July. The root, which is the part employed, should be dug up in March, when its sensible properties are in greatest perfection, and should be dried by a moderate heat. The large roots are preferred to those which are very small, and the cultivated to the wild.

The avens root consists of a short oblong body or caudex, from a quarter to half an inch in thickness, externally brown, internally white towards the circumference and reddish at the centre, and sending forth numerous long brown descending fibres. When quite dry it is nearly inodorous, but in the recent state has a smell resembling that of cloves, whence it is sometimes called *radix caryophyllatæ.* Its taste is bitterish and astringent. It imparts its medicinal virtues to water and alcohol, which it tinges red. Distilled with water it yields a thick, greenish-yellow volatile oil, and gives a pleasant flavour to the liquid. Tannin is an abundant constituent. It contains, moreover, according to Trommsdorff, an insipid resin, gum, bassorin, and lignin.

Medical Properties and Uses. This root has been largely used on the continent of Europe as a tonic and astringent in numerous diseases. Among these are chronic and passive hemorrhages, chronic dysentery and diarrhœa, leucorrhœa, congestions of the abdominal viscera, and intermittent fever. The dose of the powdered root is from thirty grains to a drachm three or four times a day, and the same quantity may be given at a dose in the form of decoction. The medicine is scarcely used in the United States.

W

GILLENIA. *U.S.*

Gillenia.

"Gillenia trifoliata, *Bigelow* and *Barton.* Spiræa trifoliata, *Willd.* Radix. *The root.*" *U.S.*

Indian physic, American ipecacuanha.

Gillenia. *Sex. Syst.* Icosandria Pentagynia.—*Nat. Ord.* Rosaceæ.

Gen. Ch. Calyx tubular campanulate, border five-toothed. *Corolla* partly unequal. *Petals* five, lanceolate, attenuated at the base. *Stamens* few, included. *Styles* five. *Capsules* five, connate at the base, opening on the inner side, each two-seeded. *Torrey.*

This genus was separated by Moench from the *Spiræa*, but was not generally acknowledged till after the publication of Barton's Medical Botany. It is exclusively North American, and includes only two discovered species—the *G. trifoliata* and *G. stipulacea*—of which the former only has been adopted in our Pharmacopœia, though the two are identical in medical character.

1. *Gillenia trifoliata.* Bigelow, *Am. Med. Bot.* iii. 10; Barton, *Med. Bot.* i. 65. This is an herbaceous plant with a perennial root, consisting of numerous long, slender, brown branches, proceeding from a thick tuber-like head or caudex. The stems, several of which usually rise from the same root, are two or three feet in height, erect, slender, smooth, flexuose, branched, and commonly of a reddish colour. The leaves are ternate, with very short petioles, and small linear lanceolate stipules. The leaflets are ovate lanceolate, sharply serrate, and acuminate. The flowers grow in a loose terminal nodding panicle, with long peduncles. The calyx is tubular campanulate, ventricose, and terminates in five pointed segments. The corolla is composed of five linear lanceolate, recurved petals, the two upper separated from the three lower, white, with a reddish tinge on their border, and of three times the length of the calyx. The stamens are twenty, the filaments short, the anthers small and yellow. Each flower is succeeded by five capsules, connate at their base, oblong, acuminate, gibbous without, acute within, two-valved, one-celled, opening inward, and containing each one or two oblong seeds.

This species of Gillenia grows throughout the United States, east of the Alleghany ridge. Pursh found it in Florida, and it extends as far north as Canada. It frequents light soils, in shady and moist situations, and flowers in June and July. The root should be gathered in September.

2. *G. stipulacea.* Barton, *Med. Bot.* i. 71. This species is also herbaceous and perennial, though much taller, and more bushy than the preceding. The stems are brownish and branched. The upper leaves are ternate, lanceolate, serrate; the lower more deeply incised, becoming towards the root pinnatifid, and of a reddish-brown colour at the margin. The stipules are ovate, acuminate, deeply serrate, resembling leaves, and marking the species at the first glance. The flowers are smaller than those of the *G. trifoliata*, and grow on long slender peduncles in a lax corymb.

In the valley of the Mississippi this plant occupies the place of the G. trifoliata, which is not found beyond the Muskingum. It grows as far north as the state of New York, extends through Ohio, Indiana, Illinois, and Missouri, and probably into the states south of the Ohio, as it has been found in Western Virginia. Its root is precisely similar to that of the eastern species, and is reputed to possess the same properties.

The dried root of gillenia is not thicker than a small quill, wrinkled longitudinally, with occasional transverse fissures, and in the thicker pieces presenting in some places an irregular undulated somewhat knotty appearance, arising from indentations on one side corresponding with prominences on the other. It is externally of a light brown colour, and consists of a thick, somewhat reddish, brittle, cortical portion, with an interior slender, tougher, whitish ligneous cord. The bark, which is easily separable, has a bitter, not disagreeable taste; the wood is nearly insipid and comparatively inert, and should be rejected. The powder is of a light brownish colour, and possesses a feeble odour which is scarcely perceptible in the root. The bitterness is extracted by boiling water, which acquires the red colour of wine. The root has not been accurately analyzed.

Medical Properties and Uses. Gillenia is a mild and efficient emetic, and, like most other substances belonging to the same class, occasionally acts upon the bowels. In very small doses it has been thought to exert a tonic influence. It is much used by some practitioners in the country, as a substitute for ipecacuanha, which it is said to resemble in its mode of operation. It was employed by the Indians, and became known as an emetic to the colonists at an early period. Linnæus was aware of its reputed virtues. The dose of the powdered root is from twenty to thirty grains, repeated at intervals of twenty minutes till it vomits. W.

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GLYCYRRHIZA. *U.S.*

Liquorice Root.

"Glycyrrhiza glabra. Radix. *The root.*" *U.S.*

Off. Syn. GLYCYRRHIZÆ RADIX. Glycyrrhiza glabra. Radix. *Lond.;* GLYCYRRHIZÆ GLABRÆ RADIX. *Ed.;* GLYCYRRHIZA GLABRA. Radix. *Dub.*

Bois de reglisse, *Fr.;* Süssholzwurzel, *Germ.;* Liquirizia, *Ital.;* Regaliza, *Span.*

GLYCYRRHIZA. *Sex. Syst.* Diadelphia Decandria.—*Nat. Ord.* Leguminosæ.

Gen. Ch. Calyx bilabiate; upper lip three-cleft, lower undivided. *Legume* ovate, compressed. *Willd.*

Glycyrrhiza glabra. Willd. *Sp. Plant.* iii. 1144; Woodv. *Med. Bot.* p. 420. t. 152. The liquorice plant has a perennial root, which is round, succulent, tough, and pliable, furnished with sparse fibres, rapid in its growth, and in a sandy soil penetrates deeply into the ground. The stems are herbaceous, erect, and usually four or five feet in height; have few branches; and are garnished with alternate, pinnate leaves, consisting of several pairs of ovate, blunt, petiolate leaflets, with a single leaflet at the end, of a pale green colour, and clammy on their under surface. The flowers are violet or purple, formed like those of the pea, and arranged in axillary spikes supported on long peduncles. The calyx is tubular and persistent. The fruit is a compressed, smooth, acute, one-celled legume, containing from one to four small kidney-shaped seeds.

The plant is a native of the South of Europe, Barbary, Syria, and Persia; and is cultivated in England, the North of France, and Germany. Much of the root imported into this country comes from the ports of Messina and Palermo in Sicily. It is also largely produced in the northern provinces of Spain, where it forms an important article of commerce. It is not improbable that a portion of the liquorice root from Italy and Sicily is the product of the *G. echinata*, which grows wild in Apulia. This species is also abundantly produced in the South of Russia, where, according to Hayne, sufficient extract is prepared from it to supply the whole Russian empire.

A species of Glycyrrhiza, the *G. lepidota*, grows abundantly about St. Louis, in the state of Missouri, and flourishes along the banks of the Missouri river to its source in the mountains. It is probably the same with the liquorice plant mentioned by Mackenzie as growing on the northern coast of this continent. Mr. Nuttall states that its root possesses in no inconsiderable degree the taste of liquorice; and it is not improbable that it may be found a fit substitute for that of the G. glabra.

Properties. The liquorice root of the shops is in long pieces, varying in thickness from a few lines to more than an inch, fibrous, externally grayish-brown and wrinkled by desiccation, internally yellowish, without smell, and of a sweet mucilaginous taste, which is sometimes mingled with a slight degree of acrimony. It is often worm-eaten and more or less decayed. The best pieces are those which have the brightest yellow colour internally, and of which the layers are distinct. The powder is of a grayish-yellow colour when the root is pulverized without being deprived of its epidermis, of a pale sulphur yellow, when the epidermis has been removed. Robiquet found the following ingredients in liquorice root:—1. A peculiar transparent yellow substance, called *glycyrrhizin*, of a sweet saccharine taste, scarcely soluble in cold water, very soluble in boiling water with which it gelatinizes on cooling, thrown down from its aqueous solution by acids, readily soluble in cold alcohol, insusceptible of the vinous fermentation, yielding no oxalic acid by the action of the nitric, and therefore wholly distinct from sugar; 2. a crystallizable principle, named *agedoïte* by Robiquet, but subsequently proved to be identical with *asparagin;* 3. starch; 4. albumen; 5. a brown, acrid resin; 6. a brown, azotized, extractive matter; 7. lignin; 8. salts of lime and magnesia with phosphoric, sulphuric, and malic acids. Robiquet prepared *glycyrrhizin* by subjecting a strong cold infusion of the root to ebullition, in order to separate the albumen; then filtering, precipitating with acetic acid, and washing the precipitate with cold water to remove any adhering acid. Berzelius considers the matter thus obtained as a compound of glycyrrhizin with acetic acid. He procures the principle in a pure state by precipitating with sulphuric acid an infusion of the root previously concentrated by a gentle heat, washing the precipitated sulphate to remove the free acid which adheres to it, then dissolving it in alcohol, which leaves the albumen, and adding carbonate of potassa to the alcoholic solution to perfect neutralization. The sulphate of potassa is precipitated, and the glycyrrhizin is obtained by evaporating the alcohol. The sweetness of this principle is retained in the compounds which it forms both with acids and alkalies.

An extract of liquorice root is brought from Spain and Italy, and much used under the name of liquorice. (See *Extractum Glycyrrhizæ.*)

Medical Properties and Uses. Liquorice root is an excellent demulcent, well adapted to catarrhal affections, and to irritations of the mucous membrane of the bowels and urinary passages. It is best given in the form of decoction, either alone, or combined with other demulcents. It is frequently employed as an addition to the decoctions of acrid or irritating vegetable substances, such for example as seneka and mezereon, the acrimony of which it covers and conceals, while it renders them more acceptable to the stomach. Before being used, it should always be deprived of its epidermis, which is somewhat acrid, without possessing any of the virtues of the root. The decoction may be prepared by boiling an ounce of the bruised root for a few minutes in a pint of water. By long boiling, the acrid principle is extracted.

The powder is used in the preparation of pills, either to give them due consistence, or to cover their surface and prevent them from adhering together.

Off. Prep. Aqua Calcis Composita, *Dub.;* Confectio Sennæ, *U. S., Lond., Ed.;* Decoctum Glycyrrhizæ, *Dub.;* Decoctum Guaiaci Compositum, *Ed., Dub.;* Decoctum Hordei Compositum, *Lond., Dub.;* Decoctum Mezerei, *Dub., Ed.;* Decoctum Sarsaparillæ Compositum, *U.S., Lond., Dub.;* Infusum Lini, *U.S., Lond., Dub.;* Pilulæ Hydrargyri, *U.S., Lond., Dub.;* Syrupus Sarsaparillæ, *U.S.;* Tinctura Rhei Composita, *Lond., Dub.*

W.

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GRANATUM. *U.S.*

Pomegranate.

"Punica granatum. Fructûs cortex. *The rind of the fruit.*" *U.S.*

Off. Syn. GRANATI CORTEX. Punica Granatum. Pomorum cortex. *Lond.;* PUNICA GRANATUM. Baccæ tunica exterior. Radicis cortex. Flores. *Dub.*

Ecorce de grenade, *Fr.;* Granatäpfel-Echalin, *Germ.;* Malicorio, Scorza del melogranati, *Ital.;* Corteza de granada, *Span.*

Punica. *Sex. Syst.* Icosandria Monogynia.—*Nat. Ord.* Myrtaceæ.

Gen. Ch. *Calyx* five-cleft, superior. *Petals* five. *Pome* many-celled, many-seeded. *Willd.*

Punica Granatum. Willd. *Sp. Plant.* ii. 981; Woodv. *Med. Bot.* p. 531. t. 190. The pomegranate is a small shrubby tree, attaining in favourable situations the height of twenty feet, with a very unequal trunk, and numerous branches, which sometimes bear thorns. The leaves are opposite, entire, oblong or lance-shaped, pointed at each end, smooth, shining, of a bright green colour, and placed on short footstalks. The flowers are large, of a rich scarlet colour, and stand at the end of the young branches. The petals are roundish and wrinkled, and are inserted into the upper part of the tube of the calyx, which is red, thick, and fleshy. The fruit is a globular berry, about the size of an orange, crowned with the calyx, covered with a reddish-yellow, thick, coriaceous rind, and divided internally into many cells, which contain an acidulous pulp, and numerous oblong, angular seeds.

This tree grows wild upon both shores of the Mediterranean, in Arabia, Persia, and Japan, has been introduced into the East and West Indies, and is cultivated in all civilized countries where the climate is sufficiently warm to allow the fruit to ripen. In higher latitudes, where it does not bear fruit, it is raised in gardens and hot-houses for the beauty of its flowers, which become double, and acquire increased splendour of colouring by cultivation. Doubts have been entertained as to its original country. The name of "Punicum malum," applied by the ancients to its fruit, implies that it was abundant at an early age in the neighbourhood of Carthage. The fruit of the pomegranate, for which the plant is cultivated in tropical climates, varies much in size and flavour. It is said to attain greater perfection in both these respects in the West Indies, than in its native country. The pulp is red, succulent, pleasantly acid, and sweetish; and is used for the same purpose as the orange, though not officinal. It is the rind of the fruit which is indicated in the United States Pharmacopœia. Other parts of the plant, however, are used in medicine. The flowers, and the bark of the root have been adopted by the Dublin College, and the seeds are officinal in France.

Rind of the Fruit. This, which is the GRANATUM or *Pomegranate* of our Pharmacopœia, is presented in commerce under the form of irregular fragments, hard, dry, brittle, of a yellowish-brown colour, without smell, and of an astringent slightly bitter taste. It contains a large proportion of tannin, and in countries where the tree abounds, has been employed for tanning leather.

Flowers. The flowers, which are sometimes called *balaustines*, are inodorous, have a bitterish strongly astringent taste, and impart a violet-red colour to the saliva. They contain tannin and gallic acid, and were used by the ancients in dyeing.

Bark of the Root. The roots of the pomegranate are hard, heavy, knotty, ligneous, and covered with a bark which is yellowish-gray or ash-gray on the outer surface, and yellow on the inner. It has no smell, when chewed colours the saliva yellow, and leaves in the mouth an astringent taste, without any disagreeable bitterness. It contains, according to M. Mitouart, tannin, gallic acid, a substance analogous to wax, and a sweet substance of which one portion is soluble in alcohol and crystallizable, and another soluble in water with the characters of mannite. When used it should be entirely separated from the ligneous portion of the root, as the latter is inert.

Medical Properties and Uses. The rind of the fruit is astringent, and in the form of decoction may be given in diarrhœa from weakness of the secreting vessels, and in the colliquative sweats of hectic fever or simple debility. But the decoction is more frequently used as an injection in leucorrhœa, and as a gargle in sorethroat in the earliest stages, or after the inflammatory action has in some measure subsided. The powdered rind has also been recommended in intermittent fever. The flowers have the same medical properties, and are used for the same purposes as the rind. The bark of the root was used by the ancients as a vermifuge, and is recommended in the writings of Avicenna; but it was unknown in modern practice till brought into notice by Dr. F. Buchanan, who obtained his knowledge of its powers in India. The Mahometan physicians of Hindostan consider it a perfect specific in cases of tape-worm. One of these practitioners having speedily relieved an English gentleman in 1804, was induced to disclose his secret, which was then made public. Numerous cures have been subsequently effected in Europe; and there can be no doubt of the occasional efficacy of the remedy. The French medical writers prefer the bark of the root of the wild pomegranate, or that which grows on the borders of the Mediterranean, to the product of the imperfect tree cultivated for ornamental purposes in the gardens of colder countries. It may be administered in powder or decoction; but the latter form is usually preferred. M. Chevallier recommends the following mode of employing it. The patient is prepared by a dose of castor oil and a very strict regimen on the day preceding that on which the remedy is administered. A decoction is prepared by macerating two ounces of the bruised bark in two pints of water for twenty-four hours, and then boiling down to a pint. Of this, one third is given every half hour. The first and second doses generally vomit; but the third remains. Within an hour after the administration of the last dose, the patient usually has three or four stools, in which the tænia is discharged. Should the bowels not be opened, an injection should be administered. Mr. Breton, who had great success with the remedy, administered it in a similar manner, and if he did not succeed on the first day, repeated the plan for four or five days successively, taking care, however, to omit the medicine when it produced vertigo, or pain in the bowels. He followed the decoction with a dose of castor oil. The remedy appears to have been used by the negroes of St. Domingo before it was introduced into Europe. Tænia is comparatively rare in this country; and the pomegranate root has been little used.

The dose of the rind and flowers in powder is from twenty to thirty grains. A decoction may be prepared in the proportion of one ounce of the medicine to a pint of water, and given in the dose of a fluidounce.

W.

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GRATIOLÆ OFFICINALIS HERBA. *Ed.*

Hedge-hyssop.

Gratiole, *Fr.;* Wilder Aurin, *Germ.;* Graziola, *Ital.;* Graciola, *Span.*

Gratiola. *Sex. Syst.* Diandria Monogynia.—*Nat. Ord.* Scrophularineæ.

Gen. Ch. Corolla irregular, reversed. *Stamens*, two sterile. *Capsule* two-celled. *Calyx* seven-leaved; the two exterior leaves spreading. *Willd.*

Gratiola officinalis. Willd. *Sp. Plant.* i. 102; Woodv. *Med. Bot.* p. 360. t. 131. The hedge-hyssop is a perennial herb, with an erect quadrangular stem, about a foot in height, furnished with opposite, sessile, lanceolate, somewhat serrate leaves, and solitary, peduncled, axillary flowers. It is a native of the South of Europe, where it flourishes in meadows and other moist grounds. The whole herb is used.

It is nearly inodorous, but has a bitter nauseous taste. Both water and alcohol extract its active properties.

Medical Properties and Uses. Hedge-hyssop is a drastic cathartic and emetic, possessing also diuretic properties, and employed on the continent of Europe in dropsy, jaundice, worms, chronic hepatic affections, scrofula, and various other complaints. With us it is almost unknown as a remedy. The dose of the powdered herb is from fifteen to thirty grains; of the infusion, made in the proportion of half an ounce to the pint of boiling water, half a fluidounce. W.

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GUAIACI LIGNUM. *U.S.*

Guaiacum Wood.

"Guaiacum officinale. Lignum. *The wood.*" *U.S.*

Off. Syn. GUAIACI LIGNUM. Guaiacum officinale. Lignum. *Lond.;* GUAIACI OFFICINALIS LIGNUM. *Ed.;* GUAIACUM OFFICINALE. Lignum. *Dub.*

Bois de gayac, *Fr.;* Pockenholz, *Germ.;* Legno guaiaco, *Ital.;* Guayaco, *Span.*

GUAIACUM. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Rutaceæ, *Juss.;* Zygophylleæ, *R. Brown, Lindley.*

Gen. Ch. Calyx five-cleft, unequal. *Petals* five, inserted into the calyx. *Capsule* angular, three or five-celled. *Willd.*

Guaiacum officinale. Willd. *Sp. Plant.* ii. 538; Woodv. *Med. Bot.* p. 557. t. 200. This is a large tree of very slow growth. When of full size it is from forty to sixty feet high, with a trunk four or five feet in circumference. The branches are knotted, and covered with an ash-coloured striated bark. That of the stem is of a dark gray colour, variegated with greenish or purplish spots. The leaves are opposite, and abruptly pinnate, consisting of two, three, and sometimes four pairs of leaflets, which are obovate, veined, smooth, shining, dark green, from an inch to an inch and a half long, and almost sessile. The flowers are of a rich blue colour, stand on long peduncles, and grow to the number of eight or ten at the axils of the upper leaves. The seeds are solitary, hard, and of an oblong shape.

The *G. officinale* grows in the West Indies, particularly in Hayti and Jamaica, and is found also in the warmer parts of the neighbouring continent. All parts of the tree are possessed of medicinal properties, but the wood and the concrete juice only are officinal. The bark, though much more efficacious than the wood, is not kept in the shops. It is said that other species of Guaiacum contribute to the supplies brought into the market. The *G. sanctum* of Linnæus, and the *G. arboreum* of De Candolle, are particularly specified. The former, however, is said by Woodville not to be sufficiently characterized as a distinct species from the *G. officinale.* Fée states that the wood of the *G. sanctum* is paler, less heavy and hard than the officinal.

Guaiacum wood is imported from Hayti and other West India islands, in the shape of logs or billets, covered with a thick gray bark, which presents on its inner surface, and upon its edges when broken, numerous shining crystalline points. These are supposed by M. Guibourt to be benzoic acid, by others a resinous exudation from the vessels of the plant. These billets are used by the turners for the fabrication of various instruments and utensils, for which the wood is well adapted by its extreme hardness and density. It is kept by the druggists and apothecaries only in the state of shavings or raspings, which they obtain from the turners. It is commonly called *lignum vitæ*, a name which obviously originated from the supposition that the wood was possessed of extraordinary remedial powers.

Properties. The colour of the alburnum or sap-wood is yellow, that of the older and central layers greenish-brown, that of the shavings a mixture of the two. It is said that when the wood is brought into a state of minute division, the colour is rendered green by exposure to the air, (*Richard,*) and blueish-green by the action of nitric acid fumes; and the latter change may be considered as a test of the genuineness of the drug. (*Duncan.*) Guaiacum wood is almost without smell unless rubbed or heated, when it becomes odorous. When burnt it emits an agreeable aromatic odour. It is bitterish and slightly pungent; but requires to be chewed for some time before the taste is developed. Its medicinal properties are probably dependent on the guaiac with which it is impregnated. (See *Guaiacum.*) It yields its virtues but partially to water. One pound of the wood afforded to Geiger two ounces of extract.

Medical Properties and Uses. Guaiacum wood ranks among the stimulant diaphoretics. It is said to have been introduced to the notice of European practitioners by the natives of Hispaniola soon after the discovery of

America. It was used in Europe so early as 1508, and attained great celebrity as a remedy for lues venerea, in which it was long considered a specific. More extended experience, however, has proved it to be wholly inadequate to the cure of that disease; and it is now employed simply to palliate the secondary symptoms, to assist the operation of other and more efficient remedies, or to obviate the unpleasant effects sometimes resulting from a mercurial course in syphilitic cases. It is thought to be useful also in chronic rheumatism, scrofulous affections, certain cutaneous eruptions, ozæna, and other protracted diseases dependent on a depraved or vitiated condition of the system. It is always exhibited in decoction, and generally in combination with other medicines, as in the compound decoction of sarsaparilla. As but a small proportion of the guaiac which it contains is soluble in water, the probability is that its virtues have been greatly overrated; and that the good which has in many instances followed its employment, resulted rather from the more active medicines with which it was associated, or from the attendant regimen, than from the wood itself. The simple decoction may be prepared by boiling an ounce in a pint and a half of water down to a pint, the whole of which may be administered in divided doses during the twenty-four hours.

Off. Prep. Aqua Calcis Composita, *Dub.;* Decoctum Guaiaci Compositum, *Ed.*, *Dub.;* Decoctum Sarsaparillæ Compositum, *U.S.*, *Lond.*, *Dub.;* Syrupus Sarsaparillæ, *U.S.* W.

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GUAIACUM. *U.S.*

Guaiac.

"Guaiacum officinale. Succus concretus. *The concrete juice.*" *U.S.*

Off. Syn. GUAIACI RESINA. Guaiacum officinale. Resina. *Lond.;* GUAIACI OFFICINALIS RESINA. *Ed.;* GUAIACUM OFFICINALE. Resina. *Dub.*

Résine de gayac, *Fr.;* Guajakharz, *Germ.;* Resina de guajaco, *Ital.;* Resina de guayaco, *Span.*

For a description of the *Guaiacum officinale*, see GUAIACI LIGNUM.

Guaiac is the concrete juice of this tree, obtained either by spontaneous exudation, or by incisions made into the trunk. It is also procured by sawing the wood into billets about three feet long, boring them longitudinally with an auger, then placing one end of the billet in the fire, and receiving in a calabash the melted guaiac, which flows out through the hole at the opposite extremity. Another mode, occasionally practised, is to boil the wood in the state of chips or saw-dust, in a solution of common salt, and skim off the matter which rises to the surface. Guaiac is brought to this market from the West Indies. It is usually in large irregular pieces of various size, in which small fragments of bark, sand, and other earthy impurities are mixed with the genuine guaiac, so as to give to the mass a diversified appearance. Sometimes we find it in small roundish portions, separate, or agglutinated together, and evidently the result of exudation; sometimes in homogeneous masses, prepared by melting and straining the drug in its impure state. It is probable that the guaiac, obtained from the billets of wood in the manner above described, is also of uniform consistence.

Properties. The pieces are of a deep greenish-brown or dark olive colour on their external surface, and internally wherever the air has been able to penetrate. The predominant hue of those parts not exposed to the air is reddish-brown or hyacynthine, diversified, however, with shades of various colours. The odour is feeble but fragrant, and is rendered stronger by heat. The taste which is at first scarcely perceptible, becomes acrid after a short period, and a permanent sense of heat and pungency is left in the mouth and fauces. Guaiac is brittle, and when broken presents a shining glass-like surface, conchoidal or splintery, with the smaller fragments more or less translucent. It is readily pulverized; and the powder, which is at first of a light gray colour, becomes green on exposure to the light. Its specific gravity varies from 1.2 to 1.23. It softens in the mouth, and melts with a moderate heat. Though commonly called *gum guaiac*, and till recently considered a gum-resin, it has been ascertained by Mr. Brande to be a substance sui generis, neither containing nor consisting of gum nor resin. In the Pharmacopœia of the United States, therefore, it is very properly designated by the simple title *Guaiacum.* Water dissolves 9 parts in 100, forming an infusion of a greenish-brown colour and sweetish taste, which upon evaporation yields a brown substance soluble in hot water and alcohol, but scarcely so in ether. Alcohol takes up 95 parts out of 100, leaving only impurities. The tincture is of a deep brown colour, is decomposed by water, and affords blue, green, and brown precipitates with the acids. Guaiac is soluble also in ether, in alkaline solutions, and in sulphuric acid. The solution in sulphuric acid is of a rich claret colour, deposites, when diluted with water, a lilac precipitate, and when heated evolves charcoal. Nitric acid converts it into oxalic acid. Exposed to air and light it absorbs oxygen and becomes green, and the change of colour takes place rapidly in the sunshine. It imparts a blue colour to gluten and substances containing it, to mucilage of gum Arabic, and to milk. It has been stated that *guaiac* is a substance *sui generis*; but as a part of it is soluble in water, and another part insoluble, it must consist of at least two proximate principles. The portion soluble in water, amounting to about one-tenth of the whole, is a kind of extractive; the remainder is a peculiar principle, which, though analogous to the resins, differs from this class of bodies in several particulars. It yields thirty per cent. of carbon, while the true resins yield only fifteen per cent.; is converted into oxalic acid, instead of artificial tannin, by nitric acid; and by the action of the same acid is made to pass through shades of green, blue, and brown, in this respect resembling indigo. These changes of colour are supposed to be owing to the absorption of different proportions of oxygen. The term *guaiacin*, which is applied by some writers to the whole concrete juice, and is therefore synonymous with the officinal title *Guaiacum*, should be restricted to the peculiar resin-like principle which constitutes by far the largest portion.

It will be inferred from what has been said, that the mineral acids are incompatible with the solutions of guaiac.

This drug is sometimes adulterated with the resin of the pine. The fraud may be detected by the terebinthinate odour exhaled when the sophisticated guaiac is thrown upon burning coals, as well as by its partial solubility in hot oil of turpentine. This liquid dissolves resin, but leaves pure guaiac untouched. Amber is said to be another adulteration. Nitric acid affords an excellent test of guaiac. If paper moistened with the tincture be exposed to the fumes of this acid, it speedily becomes blue.

Medical Properties and Uses. Guaiac is stimulant and alterative, producing, when swallowed, a sense of warmth in the stomach, with dryness of the mouth and thirst, and promoting various secretions. If given to a patient when covered warm in bed, especially if accompanied with opium and ipecacuanha or the antimonials, and assisted by warm drinks, it often excites profuse perspiration; and hence has been usually ranked among the diaphoretics. If the patient be kept cool during its administration, it is sometimes directed to the kidneys, the action of which it promotes. In large doses it purges; and it is thought by some practitioners to be possessed of emmenagogue powers. The complaint in which it has been found most beneficial is rheumatism. In the declining stages of the acute form of this disease, after due depletion, it is very often given in combination with opium, ipecacuanha, nitre, and the antimonials; and in the chronic form is frequently useful without accompaniment. It is also advantageously prescribed in gouty affections; and is occasionally used in secondary syphilis, scrofulous diseases, and cutaneous eruptions, though the guaiacum wood is more frequently resorted to in these latter complaints. Dr. Dewees places very great reliance upon it in the cure of amenorrhœa.

It is given in substance or tincture. The dose of the powder is from ten to thirty grains, which may be exhibited in pill or bolus, or in the shape of an emulsion formed with gum Arabic, sugar, and water. An objection to the form of powder is that it quickly aggregates. Guaiac is sometimes administered in combination with alkalies, with which it readily unites. Several of the European Pharmacopœias direct a soap of guaiac, under the name of *sapo guaiacinus*, to be prepared by diluting the Liquor Potassæ with twice its weight of water, boiling lightly, then adding guaiac gradually, with continued agitation, so long as it continues to be dissolved, and finally filtering, and evaporating to the pilular consistence. Of this preparation one scruple may be taken daily in divided doses.

Off. Prep. Mistura Guaiaci, *Lond.*; Pilulæ Hydrargyri Submuriatis Comp., *Lond.*, *Ed.*, *Dub.*; Pulvis Aloës Comp., *Lond.*, *Dub.*; Tinctura Guaiaci, *U.S.*, *Lond.*, *Ed.*, *Dub.*; Tinctura Guaiaci Ammoniata, *U. S.*, *Lond.*, *Ed.*, *Dub.* W.

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HÆMATOXYLON. *U.S.*

Logwood.

"Hæmatoxylon Campechianum. Lignum. *The wood.*" *U.S.*

Off. Syn. HÆMATOXYLI LIGNUM. Hæmatoxylon Campechianum. Lignum. *Lond.*; HÆMATOXYLI CAMPECHIANI LIGNUM. *Ed.*; HÆMATOXYLUM CAMPECHIANUM. Lignum. *Dub.*

Bois de Campêche, *Fr.*; Blutholz, Kampeschenholz, *Germ.*; Legno di Campeggio, *Ital.*; Palo de Campeche, *Span.*

HÆMATOXYLON. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Leguminosæ.

Gen. Ch. *Calyx* five-parted. *Petals* five. *Capsule* lanceolate, one-celled, two-valved, with the valves boat-form. *Willd.*

Hæmatoxylon Campechianum. Willd. *Sp. Plant.* ii. 547; Woodv. *Med. Bot.* p. 455. t. 163. This is a tree of middle size, usually not more than twenty-four feet high, though under favourable circumstances it sometimes attains an elevation of forty or fifty feet. The trunk, which seldom exceeds twenty inches in diameter, is often very crooked, and is covered with a dark rough bark. The branches are also crooked, with numerous smaller ramifications, which are beset with sharp spines. The sap-wood is yellowish; but the interior layers are of a deep red colour. The leaves are alternate, abruptly pinnate, and composed of three or four pairs of sessile, nearly obcordate, obliquely nerved leaflets. The flowers, which are in axillary spikes or racemes near the ends of the branches, have a brownish-purple calyx, and lemon-yellow petals. They exhale an agreeable odour, said to resemble that of the jonquil.

The tree is a native of Campeachy, the shores of Honduras Bay, and other parts of tropical America; and has been introduced into Jamaica, where it has become naturalized. The wood, which is the part used in medicine, is a valuable article of commerce, and largely employed in dyeing. It comes to us in logs, deprived of the sapwood, and having a blackish-brown colour externally. For medical use it is cut into chips, or rasped into coarse powder, and in these states is kept in the shops.

Properties. Logwood is hard, compact, heavy, of a deep red colour becoming dark by exposure, of a slight peculiar odour, and a sweet somewhat astringent taste. It imparts its colour to water and to alcohol. The infusion made with cold water, though red, is less so than that with boiling water. It affords precipitates with sulphuric, muriatic, and acetic acids, with alum, sulphate of copper, acetate of lead, and sulphate of iron, striking a bluish-black colour with the last mentioned salt. (*Thomson's Dispensatory.*) Gelatin throws down a precipitate, which is redissolved by an excess of that principle. (*Duncan.*) Among the constituents of logwood, according to Chevreul, are a volatile oil, an oleaginous or resinous matter, a brown substance the solution of which is precipitated by gelatin, another brown substance soluble in alcohol but insoluble in water or ether, an azotized substance resembling gluten, free acetic acid, various saline matters, and a peculiar azotized principle, called *hematin*, on which the colouring properties of the wood depend. This is obtained by digesting the aqueous extract in alcohol, evaporating the tincture till it becomes thick, then adding a little water, and submitting the liquid to a new but gentle evaporation. Upon allowing it to rest, hematin is deposited in the state of crystals, which may be purified by washing with alcohol and drying. They are shining, of a yellowish rose colour, bitterish, acrid, and slightly astringent to the taste, readily soluble in boiling water, forming an orange-red solution which becomes yellow on cooling, and soluble also in alcohol and ether. Acids added gradually to the infusion render it at first yellow and afterwards red. Alkalies render it purple-red, but in great excess produce a violet-blue colour. Hematin unites with various metallic oxides, forming blueish compounds, and yields a flocculent reddish precipitate with a strong solution of glue.

Medical Properties and Uses. Logwood is a mild astringent, devoid of irritating properties, and well adapted to the treatment of that relaxed condition of bowels which is apt to succeed cholera infantum. In this disease it is much used in the United States, and is also occasionally employed with advantage in ordinary chronic diarrhœa, and in chronic dysentery. It may be given in decoction or extract, both of which are officinal.

Off. Prep. Decoctum Hæmatoxyli, *U.S.;* Extractum Hæmatoxyli, *U.S.*, *Lond.*, *Dub.* W.

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HEDEOMA. *U.S.*

Pennyroyal.

"Hedeoma pulegioides. Herba. *The herb.*" *U.S.*

This herb, first attached to the genus *Melissa*, and afterwards to *Cunila*, is at present universally considered by botanists as belonging to the *Hedeoma* of Persoon. It has been very erroneously confounded by some with the *Mentha Pulegium*, or European pennyroyal.

HEDEOMA. *Sex. Syst.* Diandria Monogynia.—*Nat. Ord.* Labiatæ.

Gen. Ch. *Calyx* bilabiate, gibbous at the base, upper lip three toothed, lower two; dentures all subulate. *Corolla* ringent. *Stamens*, two sterile; the two fertile stamens about the length of the corolla. *Nuttall.*

Hedeoma Pulegioides. Barton, *Med. Bot.* ii. 165.—*Cunila Pulegioides.* Willd. *Sp. Plant.* i. 122. This is an indigenous annual plant, from nine to fifteen inches high, with a small, branching, fibrous, yellowish root, and a pubescent stem, which sends off numerous slender erect branches. The leaves are opposite, oblong lanceolate or oval, nearly acute, attenuated at the base, remotely serrate, rough or pubescent, and prominently veined on the under surface. The flowers are very small, of a pale blue colour, supported on short peduncles, and arranged in axillary whorls, along the whole length of the branches.

The plant is common in all parts of the United States, preferring dry grounds and pastures, and, where it is abundant, scenting the air for a considerable distance with its grateful odour.

Both in the recent and dried state it has a pleasant aromatic smell, and a warm, pungent, mint-like taste. It readily imparts its virtues to boiling water. The volatile oil upon which they depend may be separated by distillation, and employed instead of the herb itself.

Medical Properties and Uses. Pennyroyal is a gently stimulant aromatic, and may be given in flatulent colic and sick stomach, or to qualify the action of other medicines. Like most of the aromatic herbs, it possesses the property, when administered in warm infusion, of promoting perspiration, and of exciting the menstrual flux when the system is predisposed to the effort. Hence it is much used as an emmenagogue in popular practice, and frequently with success. A large draught of the warm tea is given at bed-time, in recent cases of suppression of the menses, the feet having been previously bathed in warm water.

Off. Prep. Oleum Hedeomæ, *U.S.* W.

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HELLEBORUS FŒTIDUS. *U.S. Secondary.*

Bears'-foot.

"Helleborus fœtidus. Folia. *The leaves.*" *U.S.*

Off. Syn. HELLEBORI FŒTIDI FOLIA. *Lond.*

Ellébore fœtide, Pied de griffon, *Fr.;* Stinkende Niesswurzel, *Germ.;* Elleboro fetido, *Ital.;* Heleboro hediondo, *Span.*

HELLEBORUS. *Sex. Syst.* Polyandria Polygynia.—*Nat. Ord.* Ranunculaceæ.

Gen. Ch. *Calyx* none. *Petals* five or more. *Nectaries* bilabiate, tubular. *Capsules* many-seeded, nearly erect. *Willd.*

Helleborus fœtidus. Willd. *Sp. Plant.* ii. 1337; Woodv. *Med. Bot.* p. 477. t. 170. This is a perennial European plant, with a stem about eighteen inches in height, naked and attenuated below, dividing into branches near the summit, and surrounded in the middle by numerous pedate leaves of a lurid green colour. Each leaf stands on a long footstalk, and usually consists of nine lance-shaped, serrated leaflets, four on each side joined together at their base, and one terminal. At each division of the flower-stem is a scaly leaf, three-cleft at the first ramification, then bifid, and at the last subdivisions, entire and pointed. The flowers are numerous, terminal, peduncled, and pendent; of a roundish form; with five pale green petals, tinged with purple at their margins. The whole plant, with the exception of the larger leaves, has a pale yellowish-green colour by which it may be distinguished at a distance.

The bear's foot grows in England under hedges and in shady places, and flowers in March and April. It derived its botanical designation from the offensive odour which it exhales. The leaves are the part used. Their taste is bitterish, pungent, and acrid; and when chewed they excoriate the mouth. The footstalks are even more acrid than the leaves themselves. The plant has not been analyzed.

Medical Properties and Uses. This species of hellebore is said by Allioni to be the most acrid and energetic of all the plants belonging to the genus. It is powerfully emetic and cathartic, and in very large doses produces dangerous effects. It has long been used in Great Britain as a domestic remedy for worms, and was brought before the notice of the profession by Dr. Bisset. This gentleman found it a very efficacious anthelmintic, and prescibed it also in asthma, hysteria, and hypochondriasis. M. Decerfs has known it to cause the expulsion of tænia. It is given in powder or decoction. The dose for a child from two to six years old is from five grains to a scruple of the dried leaves, or a fluidounce of the decoction made by boiling a drachm of the dried leaves in half a pint of water. This quantity should be repeated morning and night for two or three days in succession. A syrup made from the juice of the green leaves is also used in England. The remedy is scarcely known in the United States. W.

HELLEBORUS NIGER. *U.S.*

Black Hellebore.

"Helleborus niger. Radix. *The root.*" *U.S.*

Off. Syn. HELLEBORI NIGRI RADIX. *Lond.;* RADIX HELLEBORI NIGRI. *Ed.;* HELLEBORUS NIGER. Radix. *Dub.*

Ellébore noire, *Fr.;* Schwarze Niesswurzel, *Germ.;* Elleboro nero, *Ital.;* Heleboro negro, *Span.*

Helleborus. See HELLEBORUS FŒTIDUS.

Helleborus niger. Willd. *Sp. Plant.* ii. 1336; Woodv. *Med. Bot.* p. 473. t. 169. The root of the black hellebore is perennial, knotted, blackish on the outside, white within, and sends off numerous long, simple, depending fibres, which are brownish-yellow when fresh, but become dark brown upon drying. The leaves are pedate, of a deep green colour, and stand on long footstalks which spring immediately from the root. Each leaf is composed of five or more leaflets, one terminal, and two, three, or four on each side supported on a single partial petiole. The leaflets are ovate lanceolate, smooth, shining, coriaceous, and serrated in their upper portion. The flower-stem, which also rises from the root, is six or eight inches high, round, tapering, reddish towards the base, and bears one or two large, pendent, rose-like flowers, accompanied with floral leaves, which supply the place of the calyx. The petals, five in number, are large, roundish, concave, spreading, and of a white or pale rose colour, with occasionally a greenish tinge. There are two varieties of the plant—the *Helleborus* *niger humilifolius*, and *Helleborus niger altifolius*—in the former of which the leaves are shorter than the flower stem, in the latter longer.

This plant is a native of the mountainous regions of southern and temperate Europe. It is found in Greece, Austria, Italy, Switzerland, France, and Spain. It is cultivated in gardens for the beauty of its flowers, which expand in the middle of winter, and have, from this circumstance, given rise to the name of *Christmas rose*, by which the black hellebore is sometimes called.

Till the publication of Tournefort's travels in the Levant, this species of hellebore was regarded as identical with that so well known, under the same title, to the ancient Greeks and Romans. But in the island of Anticyra, and various parts of continental Greece, in which it appears from the testimony of ancient writers that the hellebore abounded, this traveller discovered a species entirely distinct from those before described, and particularly from the *H. niger*. He called it *H. orientalis*, and reasonably inferred that it was the true hellebore of the ancients: and botanists at present generally coincide with this opinion. But as the *H. niger* is also found in some parts of Greece, it is not impossible that the two species were indiscriminately employed. It is, indeed, highly probable that they possess similar properties; and a third—the *H. viridis*—which grows in the west of Europe, is said to be frequently substituted for the *H. niger*, which it closely resembles, if it does not equal in medicinal power. All three are recognised as officinal in the French Codex. The roots of various other plants not belonging to the same genus are said to be frequently substituted for the black hellebore. They may usually be readily distinguished by attending to the characters of the genuine root.*

The medicine of which we are treating is sometimes called *melampodium*, in honour of Melampus, an ancient shepherd or physician, who is said to have cured the daughters of king Prætus by giving them the milk of goats which had been fed on hellebore.

Properties. Though the whole root is kept in the shops, the fibres are the portion usually recommended. They are about as thick as a straw, when not broken from four inches to a foot in length, smooth, brittle, externally black or deep brown, internally white or yellowish-white, with little smell, and a bitterish, nauseous, acrid taste. In their recent state they are extremely acrimonious, producing on the tongue a burning and benumbing impression like that which results from taking hot liquids into the mouth. This acrimony is diminished by drying, and still further impaired by age.

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* The following minute description of the root, which we copy from Geiger's *Handbuch der Pharmacie*, may perhaps be useful in enabling the druggist to distinguish this from other analogous roots mingled with or substituted for it in commerce. "It is usually a many-headed root, with a caudex or body half an inch thick or less, seldom thicker, and several inches long, horizontal, sometimes variously contorted, uneven, knotty, with transverse ridges, slightly striated longitudinally, presenting on its upper surface the short remains of the leaf and flower-stalks, and thickly beset upon the sides and under surface with fibres of the thickness of a straw and from six to twelve inches long. These are undivided above, but at the distance of from two to six inches from their origin, are furnished with small, slender branches. The colour of the root is dark-brown, sometimes rather light-brown, dull, and for the most part exhibiting a gray, earthy tinge. Internally, it is whitish, with a somewhat darker pith, which, when cut transversely, shows lighter converging rays. Sometimes it is porous. It has a medullary or fleshy not a ligneous consistence. The fibres, when dried, are wrinkled, very brittle, sometimes grayish internally, horny, with a white point in the centre. The odour of the dried root is feeble, somewhat like that of seneka but more nauseous, especially when the root is rubbed with water. The taste is at first sweetish, then nauseously acrid and biting, but not very durable, and slightly bitterish." *Band.* ii. *s.* 1181.

MM. Feneulle and Capron obtained from black Hellebore, a volatile oil, an acrid fixed oil, a resinous substance, wax, a volatile acid, bitter extractive, gum, albumen, gallate of potassa, supergallate of lime, a salt of ammonia, and woody fibre. Water and alcohol extract its virtues, which are impaired by long boiling.

Medical Properties and Uses. Black hellebore is a drastic hydragogue cathartic, possessed also of emmenagogue powers, which by some are ascribed to a specific tendency to the uterus, by others are supposed to depend solely on the purgative property. In overdoses it produces inflammation of the gastric and intestinal mucous membrane, with violent vomiting, hypercatharsis, vertigo, cramp, and convulsions, which sometimes end in death. The fresh root applied to the skin produces inflammation and even vesication. The medicine was very highly esteemed by the ancients, who employed it in mania, melancholy, amenorrhœa, dropsy, epilepsy, various cutaneous affections, and verminose diseases. By the earlier modern physicians it was also much used. Bacher's pills, celebrated for the cure of dropsy, consisted chiefly of black hellebore. It is at present little employed, except as an emmenagogue, in which capacity it is very highly esteemed by some practitioners. Dr. Mead considered it superior to all other medicines belonging to this class. It may be given in substance, extract, decoction, or tincture. The dose of the powdered root is from ten to twenty grains as a drastic purge, two or three grains as an alterative. The decoction is prepared by boiling two drachms in a pint of water, of which a fluidounce may be given every four hours till it operates. The extract and tincture are officinal.

Off. Prep. Extractum Hellebori Nigri, *Ed., Dub.;* Tinctura Hellebori Nigri, *U.S., Lond., Ed., Dub.* W.

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HEPATICA. *U.S. Secondary.*

Liverwort.

"Hepatica Americana. Planta. *The plant.*" *U.S.*

HEPATICA. *Sex. Syst.* Polyandria Polygynia.—*Nat. Ord.* Ranunculaceæ. *Gen. Ch. Calyx* three-leaved. *Petals* six to nine. *Seeds* naked. *Nuttall.*

Hepatica Americana. De Cand.; Eaton, *Man. of Bot.* p. 241.—*H. triloba.* Willd. *Enum.*; Figured in Rafinesque's *Med. Flor.* i. 238. Botanists generally admit but one species of Hepatica, the *H. triloba;* and consider as accidental the differences of structure and colour observable in the plant. Pursh speaks of two varieties, one with the lobes of the leaf oval and acute, the other with the lobes rounded and obtuse. These are considered as distinct species by De Candolle, and the latter is the one which has been adopted by the Pharmacopœia, and is popularly employed as a medicine in this country, under the name of *liverwort.* Both have a perennial fibrous root, with three-lobed leaves, cordate at their base, coriaceous, nearly smooth, of a green colour, sometimes mottled with purple on their upper surface, glaucous and purplish beneath, and supported upon hairy footstalks from four to eight inches long, which spring directly from the root. The scapes or flower-stems are several in number, of the same length with the petioles, round, hairy, and terminating in a single white, bluish, or purplish flower. The calyx is at a little distance below the corolla, and is considered by some an involucre, while the corolla takes the name of the calyx. In the *H. acutiloba* the leaves are cordate, with from three to five entire, acute lobes; and the leaflets of the calyx are acute. In the *H. Americana* the leaves are cordate-reniform, with three entire, roundish, obtuse lobes; and the leaflets of the calyx are obtuse. Both are indigenous, growing in woods upon the sides of hills and mountains, the former, according to Eaton, preferring the northern, the latter the southern exposure. The leaves resist the cold of the winter, and the flowers make their appearance early in spring. The whole plant is used.

It is without smell, and has a mucilaginous, somewhat astringent, slightly bitterish taste. Water extracts all its active properties.

Medical Properties and Uses. Liverwort is a very mild, demulcent tonic and astringent, supposed by some to possess diuretic and deobstruent virtues. It was formerly used to some extent in Europe in various complaints, especially in chronic hepatic affections; but has fallen into entire neglect. In this country, some years since, it attracted much attention as a remedy in hæmoptysis and chronic coughs, and acquired for a time great popular confidence. Its credit, however, has already begun to decline, and it will probably ere long be forgotten. It may be used in infusion and taken ad libitum. The term *liverwort* properly belongs to the cryptogamous genus *Marchantia.* W.

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HERACLEUM. *U.S. Secondary.*

Masterwort.

"Heracleum lanatum. Radix. *The root.*" *U.S.*

HERACLEUM. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferæ.

Gen. Ch. *Fruit* elliptical, emarginate, compressed, striated, margined. *Corolla* difform, inflexed, emarginate. *Involucre* caducous. *Willd.*

Heracleum lanatum. Michaux, *Flor. Boreal. Am.* i. 166. This is one of our largest indigenous umbelliferous plants. The root is perennial, sending up annually a hollow pubescent stem, from three to five feet high, and often more than an inch in thickness. The leaves are ternate, downy on their under surface, and supported on downy footstalks; the leaflets petiolate, roundish, cordate, and lobed. The flowers are white, in large umbels, and followed by orbicular seeds.

Like the European species this is sometimes called cow-parsnip. It grows in meadows and along fences or hedges, from Canada to Pennsylvania, and flowers in June.

The root, which is the officinal part, bears some resemblance to that of common parsley in appearance. It has a strong disagreeable odour, and a very acrid taste. Both the leaves and root excite redness and inflammation when applied to the skin. Dr. Bigelow considers the plant poisonous, and advises caution in its use, especially when it is gathered from a damp situation.

Medical Properties, &c. Masterwort appears to be somewhat stimulant and carminative, and was used successfully by Dr. Orne of Salem, Massachusetts, in cases of epilepsy, attended with flatulence and gastric disorder. He directed two or three drachms of the pulverized root to be taken daily, for a long time, and a strong infusion of the leaves to be drank at bed-time. (*Thatcher's Dispensatory.*) W.

HEUCHERA. *U.S. Secondary.*

Alum-root.

"Heuchera cortusa, *Michaux.* Heuchera Americana, *Willd.* Radix. *The root.*" *U.S.*

Heuchera. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Saxifrageæ.

Gen. Ch. *Calyx* five-cleft. *Petals* five, small. *Capsule* bi-rostrate, bilocular, many-seeded. *Nuttall.*

Heuchera Americana. Willd. *Sp. Plant.* i. 1328; Barton, *Med. Bot.* ii. 159.—*H. cortusa,* Michaux, *Flor. Boreal. Am.* i. 171.—*H. viscida,* Pursh, *Flor. Am. Sept.* p. 187. The *alum-root* or *American sanicle* is a perennial, herbaceous plant, the leaves of which are all radical, petiolate, cordate, with rounded lobes, furnished with obtuse mucronate teeth. There is no proper stem; but numerous scapes or flower-stems are sent up by the same root, from one to three feet in height, very hairy in their upper part, and terminating in long, loose, pyramidal, dichotomous panicles. The calyx is small, with obtuse segments; the petals lanceolate, rose-coloured, and of the same length with the calyx; the filaments much longer, yellowish, and surmounted by small, red, globose anthers. The whole plant is covered with a viscid pubescence.

It is found in shady, rocky situations, from New England to Carolina, and flowers in June and July. The root is the medicinal portion. It is horizontal, somewhat compressed, knotty, irregular, yellowish, and of a strongly styptic taste.

Medical Properties. Alum-root is powerfully astringent, and may be employed in similar cases with other medicines belonging to the same class. It has hitherto, however, been little used. We are informed in Dr. Barton's "Collections," that it is applied by the Indians to wounds and obstinate ulcers, and that it is the basis of a powder which, when the author wrote, enjoyed some reputation as a cure for cancer. W.

HIRUDO MEDICINALIS. *Dub.*

The Leech.

Sangsue, *Fr.;* Blutegel, *Germ.;* Mignatta, *Ital.;* Sanguijuela, *Span.*

Hirudo. *Class* 1, Annelides. *Order* 3, Abranchiatæ. *Family* 2, Asetigeræ. *Cuvier.*

The leech belongs to that class of invertebrated articulated animals called *Annelides.* This class contains the worms with red blood, having soft retractile bodies composed of numerous segments or rings, breathing generally by means of branchiæ, with a nervous system consisting in a double knotted cord, destitute of feet, and supplying their place by the contractile power of their segments or rings. The third order of this class—*Abranchiatæ*—comprehends those worms which have no apparent external organ of respiration. This order is again divided into two families, to the second of which—the *Asetigeræ*, or those not having setæ to enable them to crawl—the leech belongs.

It is an aquatic worm with a flattened body, tapering towards each end, and terminating in circular flattened discs, the hinder one being the larger of the two. It swims with a vertical undulating motion, and moves when out of the water by means of these discs or suckers, fastening itself first by one and then by the other, and alternately stretching out and contracting its body. The mouth is placed in the centre of the anterior disc, and is furnished with three cartilaginous lens-shaped jaws at the entrance of the alimentary canal. These jaws are lined at their edges with fine sharp teeth, and meet so as to make a triangular incision in the flesh. The head is furnished with small raised points, supposed by some to be eyes. Respiration is carried on through small apertures ranged along the inferior surface. The nervous system consists of a cord extending the whole length, furnished with numerous ganglions. The intestinal canal is straight and terminates in the anus, near the posterior disc. Although hermaphrodite, leeches mutually impregnate each other. They are oviparous, and the eggs, varying from six to fifteen, are contained in a sort of spongy, slimy coccoon, from half an inch to an inch in diameter. These are deposited near the edge of the water, and hatched by the heat of the sun. The leech is torpid during the winter, and casts off from time to time a thick slimy coating from its skin. It can live a considerable time in sphagnous moss, or in moistened earth, and is frequently transported in this manner to great distances by the dealers.

Savigny has divided the genus Hirudo of Linnæus into several genera. The true leech is the Sanguisuga of this author, and is characterized by its three lenticular jaws, each armed with two rows of teeth, and by having ten ocular points.

Several species are used for medicinal purposes, of which the most common are the gray and the green leech of Europe, both of which are varieties of the *Hirudo medicinalis* of Linnæus; and the *Hirudo decora* of this country.

1. *Hirudo medicinalis*. Linn. *ed. Gmel.* I. 3095.—*Sanguisuga officinalis*. Savigny, *Mon. Hir. p.* 112, *t.* 5. *f.* 1. *The green leech.*—*Sanguisuga medicinalis*. Savigny, *Mon. Hir. p.* 114, *t.* 5. *f.* 2. *The gray leech.* Many of the best zoologists regard the *Sanguisuga officinalis and S. medicinalis* of Savigny as mere varieties. They are both marked with six longitudinal dorsal ferruginous stripes, the four lateral ones being interrupted or tesselated with black spots. The colour of the back varies from a blackish to a grayish-green. The belly in the first variety is of a yellowish-green colour, free from spots, and bordered with longitudinal black stripes. In the second it is of a green colour, bordered and maculated with black. This leech varies from two to three or four inches in length. It inhabits marshes and running streams, and is found abundantly throughout Europe.

The great use made of leeches in the modern practice of medicine has occasioned them to become a considerable article of commerce. They are collected in Spain, France, Italy, and Germany, and carried in large numbers to London and Paris. They are also frequently brought to this country, as the practitioners in some of our large cities use only the foreign leech, although our own waters furnish an inexhaustible supply of this useful worm.

2. *Hirudo decora*. Say, *Major Long's Second Expedition*, ii. 268. The medicinal leech of America has been described by Say under the name of *Hirudo decora*, in the appendix to the Second Expedition of Major Long. Its back is of a deep pistachio green colour, with three longitudinal rows of

square spots. These spots are placed on every fifth ring, and are twenty-two in number. The lateral rows of spots are black, and the middle range of a light brownish-orange colour. The belly is of the same colour, variously and irregularly spotted with black. The American leech sometimes attains the length of four or five inches, although its usual length is from two to three. It does not make so large and deep an incision as the European leech, and draws less blood.

The use of the indigenous leech is nearly restricted to the city of Philadelphia. The practitioners of New York and Boston depend for their supplies upon foreign countries, and leeching is seldom resorted to in the southern or western states. Those which are used in Philadelphia are generally brought from Bucks and Berks county in Pennsylvania, and occasionally from other parts of the state. It is estimated that from 200,000 to 250,000 are annually consumed.

The proper preservation of leeches is an object of importance to the practitioner, as they are liable to great and sudden mortality. They are usually kept in jars in clear water, which should be changed twice or three times a week. The jar must be covered with a linen cloth, and placed in a situation not liable to sudden changes of temperature. They will live a long time, and continue active and healthy, without any other attention than that of frequently changing the water in which they are kept. M. Derheims has proposed the following excellent method of preserving them. In the bottom of a large basin or trough of marble he places a bed six or seven inches deep, of a mixture of moss, turf, and fragments of wood. He strews pebbles above, so as to retain them in their place without compressing them too much, or preventing the water from freely penetrating them. At one end of the trough, and about mid-way of its height, is placed a thin slab of marble or earthenware, pierced with numerous holes and covered with a bed of moss, which is compressed by a thick layer of pebbles. The reservoir being thus disposed is half filled with water, so that the moss and pebbles on the shelf shall be kept constantly moist. The basin is protected from the light by a linen cover stretched over it. By this arrangement the natural habits of the leech are not counteracted. One of these habits, essential to its health, is that of drawing itself through the moss and roots to clear its body from the slimy coat which forms on its skin, and is a principal cause of its disease and death.

Medical Uses. Leeches afford the least painful, and in many instances the most effectual means for the local abstraction of blood. They are often applicable to parts which, either from their situation, or their great tenderness when inflamed, do not admit of the use of cups; and in the cases of infants, are, under all circumstances, preferable to this instrument They are indeed a powerful therapeutic agent, and give to the physician, in many instances, a control over disease which he could obtain in no other way. Their use is in great measure restricted to the treatment of local inflammations; and, as a general rule, they should not be resorted to until the force of the circulation has been diminished by bleeding from the arm, or in the natural progress of the complaint.

In applying leeches to the skin, care should be taken to shave off the hair, if there be any, and to have the part well cleansed with soap and water, and afterwards with pure water. If the leech does not bite readily, the skin should be moistened with a little blood, or milk and water. Sometimes the leech is put into a large quill open at both ends, and applied with the head to the skin until it fastens itself, when the quill is withdrawn. Leeches continue to draw blood until they are gorged, when they drop off. The quantity of blood which they will draw varies according to the part to which they are applied, and the degree of inflammation existing in it. In the loose and vascular textures they will abstract more than in those which are firm and compact, and more from an inflamed than a healthy part. As a general rule, our leechers apply six for every fluidounce of blood. A single European leech will draw from half an ounce to an ounce. The quantity may often be much increased by bathing the wound with warm water. Leeches will continue to suck after their tails are cut off, which is sometimes done, although it is a barbarous practice. They may be separated from the skin at any time by sprinkling a little salt upon them. After they drop off the same application will make them disgorge the blood they have swallowed. Some leechers draw the leeches from the tail to the head through their fingers, and thus squeeze out the blood, after which all that is necessary is to put them in clean water and change it frequently. Leeches which are gorged with blood should be kept in a vessel by themselves, as they are more subject to disease, and often occasion a great mortality among the others. They should not be again used until they have recovered their activity.

In cases where the bleeding from leech-bites continues longer than is desirable, it may be stopped by continued pressure, with the application of lint, or by touching the wounds with lunar caustic.* It may sometimes be necessary, in the case of a deep bite, to sew the wound, which is readily done with a single stitch of the needle that need not penetrate deeper than the cutis. D. B. S.

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HORDEUM. *U.S.*

Barley.

"Hordeum distichon. Semina decorticata. *The seeds decorticated.*" *U.S.*

Off. Syn. HORDEI SEMINA. Hordeum distichon. Semina, tunicis nudata. *Lond.*; HORDEI DISTICHI SEMINA. Semina decorticata. *Ed.*; HORDEUM DISTICHON. Semina decorticata. *Dub.*

Orge, *Fr.*; Gerstengraupen, *Germ.*; Orzo, *Ital.*; Cebada, *Span.*

HORDEUM. *Sex. Syst.* Triandria Digynia.—*Nat. Ord.* Gramineæ.

Gen. Ch. *Calyx* lateral, two valved, one-flowered, three-fold. *Willd.*

Several species of Hordeum are cultivated in different parts of the world. The most common are the *H. vulgare*, and the *H. distichon*, both of which have been introduced into the United States.

1. *Hordeum vulgare.* Willd. *Sp. Plant.* i. 472; Loudon's *Encyc. of Plants.* p. 73. The culm or stalk of common barley is from two to four feet in height, fistular, and furnished with alternate, sheathing, lanceolate, roughish, and pointed leaves. The flowers are all perfect, and arranged in a close terminal spike, the axis of which is dentate, and on each tooth supports three sessile flowers. The calyx or outer chaff has two valves. The corolla or inner chaff is also composed of two valves, of which the exterior is larger than the other, and terminates in a long rough, serrated awn or beard. The seeds are arranged in four rows.

2. *H. distichon.* Willd. *Sp. Plant.* i. 473; Loudon's *Encyc. of Plants*, p. 73. This species is distinguished by its flat spike or ear, which on each flat side has a double row of imperfect or male florets without beards, and on each edge, a single row of bearded perfect or hermaphrodite florets.

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* A little cotton, impregnated with a saturated solution of alum, will sometimes be found an effectual application.

The seeds therefore are in two rows, as indicated by the specific name of the plant.

The original country of the cultivated barley is unknown. The plant has been found growing wild in Sicily, and various parts of the interior of Asia; but it may have been introduced into these places. The *H. vulgare* is said by Pursh to grow in some parts of the United States, apparently in a wild state. The seeds are used in various forms.

1. In their natural state they are oval, oblong, pointed at one end, obtuse at the other, marked with a longitudinal furrow, of a yellowish colour externally, white within, having a faint odour when in mass, and a mild sweetish taste. They contain, according to Proust, in 100 parts, 32 of starch, 3 of gluten, 5 of sugar, 4 of gum, 1 of yellow resin, and 55 of *hordein*, a principle closely analogous to lignin. Berzelius suggests that hordein may be an intimate mixture of vegetable fibre with gluten and starch, which are very difficultly separable as they exist in this grain. Einhoff found in 100 parts, 67.18 of starch, 5.21 of uncrystallizable sugar, 4.62 of gum, 3.52 of gluten, 1.15 of albumen, 0.24 of phosphate of lime, and 7.29 of vegetable fibre; the remainder being water and loss.

2. *Malt* consists of the seeds made to germinate by warmth and moisture, and then baked so as to deprive them of vitality. By this process the sugar, starch, and gum are increased at the expense of the *hordein*, as shown by the analysis of Proust, who found in 100 parts of malt, 56 of starch, 1 of gluten, 15 of sugar, 15 of gum, 1 of yellow resin, and only 12 of *hordein*. Berzelius attributes the diminution of the hordein to the separation, during germination, of the gluten or starch from the fibrous matter with which he supposes them to be associated in that substance. It is in the form of malt that barley is so largely consumed in the manufacture of malt liquors.

An interesting substance called *diastase* has recently been discovered by MM. Payen and Persoz in the seeds of barley, oats, and wheat, and in the potato. It is found, however, only after these have undergone germination, of which process it appears to be a product. Germinated barley seldom contains it in larger proportion than two parts in a thousand. It is obtained by bruising freshly germinated barley, adding about half its weight of water, expressing strongly, treating the viscid liquid thus obtained with sufficient alcohol to destroy its viscidity, then separating the coagulated albumen, and adding a fresh portion of alcohol, which precipitates the diastase in an impure state. To render it pure, it must be redissolved as often as three times in water, and precipitated by alcohol. It is solid, white, tasteless, soluble in water and weak alcohol, but insoluble in the latter fluid in a concentrated state. Though without action upon gum and sugar, it has the extraordinary property, when mixed, in the proportion of only one part to 200, with starch suspended in water, and maintained at a temperature of about 160°, of converting this principle into dextrine and the sugar of grapes. The whole of the starch undergoes this change, with the exception of the teguments of the granules, amounting to about 4 parts in 1000.—(Thénard, *Traité de Chim.* 6me ed. iv. 603.)

3. *Hulled barley* is merely the grain deprived of its husk, which, according to Einhoff, amounts to 18.75 parts in the hundred.

4. *Barley meal* is formed by grinding the seeds previously deprived of their husk. It has a grayish-white colour, and contains, according to Fourcroy and Vauquelin, an oleaginous substance, sugar, starch, azotized matter, acetic acid, phosphate of lime and magnesia, silica, and iron. It may be made into a coarse, heavy, hard bread, which in some countries is much used for food.

5. *Pearl barley—hordeum perlatum*—is the seed deprived of all its investments, and afterwards rounded and polished in a mill. It is in small round or oval grains, having the remains of the longitudinal furrow of the seeds, and of a pearly whiteness. It is wholly destitute of hordein, and abounds in starch, with some gluten, sugar, and gum. This is the proper officinal form of barley, and is kept in the shops almost to the exclusion of the others.

Medical Properties. Barley is one of the mildest and least irritating of farinaceous substances; and, though not medically used in its solid state, forms by decoction with water, a drink admirably adapted to febrile and inflammatory complaints, and much employed from the times of Hippocrates and Galen to the present. Pearl barley is the form usually preferred for the preparation of the decoction, though the hulled grain is sometimes used, and malt affords a liquor more demulcent and nutritious, and therefore better adapted to cases of disease which require a supporting treatment. (See *Decoctum Hordei.*) The decoction of malt may be prepared by boiling from two to four ounces in a quart of water and straining the liquor. When hops are added, the decoction takes the name of wort, and acquires tonic properties, which render it useful in debilitated conditions of the system, especially those which attend the suppurative process.

Off. Prep. Decoctum Hordei, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Decoctum Hordei Compositum, *Lond.*, *Dub.* W.

HUMULUS. *U.S.*

Hops.

"Humulus lupulus. Strobili. *The strobiles.*" *U. S.*

Off. Syn. HUMULI STROBILI. Humulus Lupulus. Strobili siccati. *Lond.;* HUMULI LUPULI STROBILI, *Ed.;* HUMULUS LUPULUS. Strobili siccati. *Dub.*

Houblon, *Fr.*, Hopfen, *Germ.;* Luppolo, *Ital.;* Lupulo, Hombrecillo, *Span.*

HUMULUS. *Sex. Syst.* Diœcia Pentandria.—*Nat. Ord.* Urticeæ.

Gen.Ch. MALE. *Calyx* five-leaved. *Corolla* none. FEMALE. *Calyx* one-leafed, obliquely spreading, entire. *Corolla* none. *Styles* two. *Seed* one, within a leafy calyx. *Willd.*

Humulus Lupulus. Willd. *Sp. Plant.* iv. 769; Bigelow, *Am. Med. Bot.* iii. 163. The root of the hop is perennial, and sends up numerous annual, angular, rough, flexible stems, which twine around neighbouring objects in a spiral direction, from left to right, and climb to a great height. The leaves are opposite, and stand upon long footstalks. The smaller are sometimes cordate; the larger have three or five lobes; all are serrate, of a deep green colour on the upper surface, and, together with the petioles, extremely rough, with minute prickles. At the base of the footstalks are two or four smooth, ovate, reflexed stipules. The flowers are numerous, axillary, and furnished with bractes. The male flowers are yellowish-white, and arranged in panicles; the female, which grow on a separate plant, are pale green, and disposed in solitary, peduncled aments, composed of membranous scales, ovate, acute, and tubular at the base. Each scale bears near its base, on its inner surface, two flowers, consisting of a roundish compressed germ, and two styles, with long filiform stigmas. The aments are converted into ovate membranous cones or strobiles, the scales of which contain each at their base two small seeds, surrounded by a yellow, granular, resinous powder.

The hop is a native of North America and Europe. It is occasionally found growing wild in the Eastern States, and, according to Mr. Nuttall, is abundant on the banks of the Mississippi and Missouri. In New England it is extensively cultivated, and most of the hops consumed in the United States, are supplied by that district of country. The part of the plant used, as well in the preparation of malt liquors as in medicine, is the fruit or strobiles. These when fully ripe are picked from the vine, dried by artificial heat, packed in bales, and sent into the market, under the name of hops.

They consist of numerous thin, translucent, veined, leaf-like scales, which are of a pale greenish-yellow colour, and contain near their base two small, round, black seeds. Though brittle when quite dry, they are pulverized with great difficulty. Their odour is strong, peculiar, somewhat narcotic and fragrant; their taste very bitter, aromatic, and slightly astringent. Their aroma, bitterness, and astringency are imparted to water by decoction; but the first mentioned property is dissipated by long boiling. The most active part of hops is a substance secreted by the scales, and in the dried fruit existing upon their surface in the form of a fine powder. This substance was called *lupulin* by Dr. A. W. Ives, of New York, by whom its properties were first investigated, and made generally known; though it appears to have been previously noticed by Sir J. E. Smith of England, and M. Planche of France. It enters into the officinal catalogue of the United States Pharmacopœia. The scales themselves, however, are not destitute of virtues, and contain, as shown by MM. Payen and Chevallier, the same active principles as the powder upon their surface, though in smaller proportion.

LUPULINA. *Lupulin, U.S.* This is obtained separate by rubbing or threshing and sifting the strobiles, of which it constitutes from one sixth to one-tenth by weight. It is in the state of a fine yellowish powder, mixed with minute particles of the scales, from which it cannot be entirely freed when procured by a mechanical process. It has the peculiar flavour of hops, and appeared to MM. Lebaillif and Raspail, when examined by the microscope, to consist of globules filled with a yellow matter, resembling in this respect the pollen of vegetables. It is inflammable, and when moderately heated becomes somewhat adhesive. MM. Chevallier and Payen obtained from 200 parts, 105 of resin, and 25 of a peculiar bitter principle, besides volatile oil, gum, traces of fixed oil, a small quantity of an azotized substance, and various salts. Dr. Ives found in 120 grains, 5 of tannin, 10 of extractive, 11 of bitter principle, 12 of wax, 36 of resin, and 46 of lignin. The virtues of the powder probably reside in the volatile oil and bitter principle, and are readily imparted to alcohol. By boiling in water the bitterness is extracted, but the aroma is partially driven off.

It has been proposed, with reason, to restrict the name *lupulin* to the bitter substance discovered both in the powder and the scales, as this is in all probability the peculiar active principle of the plant. In a state of purity, it is yellowish or orange-yellow, inodorous at common temperatures, but of the smell of hops when heated, of the peculiar bitter taste of hops, slightly soluble in water which takes up five per cent. of its weight, readily soluble in alcohol, almost insoluble in ether, neither acid nor alkaline in its reaction, and without nitrogen in its composition. It is scarcely affected by the weak acids or alkaline solutions, or by the metallic salts.

Medical Properties and Uses. Hops are tonic and moderately narcotic, and have been highly recommended in diseases of general or local debility, associated with morbid vigilance, or other nervous derangement. They have some tendency to produce sleep and relieve pain, and may be used for these purposes in cases where opiates, from their tendency to constipate, or other cause, are inadmissible. Diuretic properties have also been ascribed to them, but are by no means very obvious. The complaints in which they have been found most useful are dyspepsia, and the nervous tremors, wakefulness, and delirium of drunkards. Dr. Maton found the extract advantageous in allaying the pain of articular rheumatism.

The medicine may be given in substance, infusion, tincture, or extract. From three to twenty grains are mentioned as the dose of the powder; but the quantity is too small to produce any decided effect; and this mode of administration is in fact scarcely ever resorted to. An infusion prepared from half an ounce of hops and a pint of boiling water, may be given in the dose of two fluidounces three or four times a day. The extract and tincture are officinal. (See *Extractum Humuli* and *Tinctura Humuli.*) A pillow of hops has been found useful in allaying restlessness and producing sleep, in cases of nervous derangement. They should be moistened with some spirituous liquor previously to being placed under the head of the patient, in order to prevent their rustling noise. Fomentations with hops, and cataplasms made by mixing them with some emollient adhesive substance, are often beneficial in local pains and tumefaction. An ointment of the powder with lard is recommended by Mr. Freake as an application to cancerous sores, the pain of which it has relieved when other means have failed.

All the effects of the preparations of hops may be obtained with greater certainty and convenience by the use of *lupulin.* The dose of this in substance is from six to twelve grains, given in the form of pills, which may be made by simply rubbing the powder in a warm mortar till it acquires the consistence of a ductile mass, and then moulding it into the proper shape. A tincture is directed by the United States Pharmacopœia. (See *Tinctura Lupulinæ.*) Lupulin may be incorporated with poultices, or formed into an ointment with lard, and used externally for the same purposes as the hops themselves.

Off. Prep. Extractum Humuli, *Lond., Ed.;* Tinctura Humuli, *U.S., Lond., Ed., Dub.;* Tinctura Lupulinæ, *U.S.* W.

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HYDRARGYRUM. *U.S., Lond., Dub.*

Mercury.

Off. Syn. HYDRARGYRUS. *Ed.*

Quicksilver; Mercurius, *Lat.;* Mercure, Vif argent, *Fr.;* Quecksilber, *Germ.;* Mercurio, *Ital.;* Azógue, *Span.* and *Port.*

This metal is found native, combined with sulphur, united with silver, and in the form of chloride; but of all its combinations, the most abundant is the sulphuret, or native cinnabar. Its most important mines are found at Almaden in Spain, at Idria in Austria, in the Duchy of Deux Ponts, at Durasno in Mexico, near Azogue in New Granada, and near Huancavelica in Peru. It also occurs in the Philippine Islands and China. The most ancient and productive mine of mercury is that of Almaden, which is estimated to furnish six thousand quintals annually to commerce. Mercury in small quantities is said to have been found in the United States, in Ohio and Michigan Territory. (*Cleveland.*)

Extraction. Nearly all the mercury consumed in medicine and the arts, is obtained from the sulphuret or native cinnabar. It is extracted by two principal processes. According to one process the mineral is picked, pounded, and mixed with slaked lime. The mixture is then introduced into cast iron retorts, which are placed in rows, one above the other, in an oblong furnace, and connected with earthenware receivers, one-third full of water. Heat being applied, the lime combines with the sulphur, forming sulphuret of calcium and sulphate of lime, while the mercury distils over, and is condensed in the receivers. The other process is practised at Almaden in Spain. Here a square furnace is employed, the floor of which is pierced with many holes, for the passage of the flame from the fireplace underneath. At the upper and lateral part of the furnace, holes are made, which communicate with several rows of *aludels*,* which terminate in a small chamber that serves both as condenser and receiver. The mineral having been picked by hand and pulverized, is kneaded with clay and formed into small masses which are placed on the floor of the furnace. The heat being applied, the sulphur undergoes combustion, while the mercury, being volatilized, passes through the aludels to be condensed in the chamber. This process economizes fuel, but is wasteful of the mercury. A quintal of mineral yields from six to ten ounces of the metal.

Commercial History. Mercury is imported into this country generally in cylindrical iron bottles, called flasks, each containing 76½ pounds, and comes principally from the Atlantic ports of Spain, particularly Cadiz. A considerable portion also is received from the Austrian port of Trieste, from which it generally comes tied up in whole skins of white leather, forming bags, each containing 31 pounds, and four of which are usually packed together with straw in a rough flattened keg. In both Spain and Austria, the produce of the quicksilver mines is a government monopoly. In Spain all the metal is brought from the mines to Seville, whence, after paying an export duty, it is carried by small vessels down the river Guadalquivir to Cadiz and Gibraltar, which are the chief places of its depot for foreign commerce. The quantity imported into the United States varies in different years; but it appears by the Treasury returns that its value for the year ending in Sep. 1832, exceeded two hundred and sixty-three thousand dollars. A small portion of this only is consumed with us, the rest being exported principally to Mexico, Chili, and China. Its principal consumption is caused by its employment in the extraction of silver and gold from its ores, and in the preparation of vermilion. In the United States it is consumed for making thermometers and barometers, for silvering looking-glasses, and for preparing various pharmaceutical compounds. Of late the home consumption has increased in consequence of its employment in the mining operations of the gold region of the Southern States.

Properties. Mercury is a very brilliant liquid, of a silver-white colour, and without taste or smell. When perfectly pure it undergoes no alteration by the action of air or water, but, in its ordinary state, suffers a slight tarnish. When heated to near the boiling point, it gradually combines with oxygen, and becomes converted into peroxide; but at the temperature of ebullition, it parts with the oxygen which it had absorbed, and is reduced again to the metallic state. Its sp. gr. is 13.5, and its equivalent number 202. Liquid at ordinary temperatures, it freezes at 39° below zero, and boils at 656°. When frozen, it forms a soft malleable solid. It is a good conductor of caloric and its specific heat is small. It is not attacked by muriatic acid, nor by cold sulphuric acid; but boiling sulphuric acid, or cold nitric acid dissolves it, generating either a persulphate or pernitrate, with the extrication, in the former case, of sulphurous acid, in the latter of nitric oxide becoming nitrous acid red fumes. Its combinations are numerous, and several of them constitute important medicines. It forms two oxides, two sulphurets, two chlorides, and one cyanuret, all of which are used in medicine or pharmacy, and will be noticed elsewhere under separate heads. Both the oxides are capable of uniting with acids so as to form salts, of which the nitrate, sulphate, bisulphate, and acetate of the peroxide are officinal, or enter into officinal combinations.

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* Aludels are a kind of pot, open at both ends, and which admit of being adjusted to one another, so as to form a sort of tube.

Mercury, as it occurs in commerce, is generally very pure; though occasionally it contains foreign metals, such as lead, bismuth, and tin. Mr. Brande informs us that in examining large quantities of this metal in the London market, he found it only in one instance intentionally adulterated. That which comes to the United States is also very pure. When impure, the metal has a dull appearance, easily tarnishes, is deficient in due fluidity and mobility, and when shaken in a phial soils or adheres to the glass. If agitated with dilute sulphuric acid, the adulterating metals become rapidly oxidized, and in this manner the mercury may in part be purified. Lead is detected by shaking the suspected metal with equal parts of acetic acid and water, and then testing the acid by sulphate of soda, or iodide of potassium. The former will produce a white, the latter a yellow precipitate, if lead be present. Bismuth is discovered by dropping a nitric solution of the mercury, prepared without heat, into distilled water, when the subnitrate of bismuth will precipitate; and the presence of tin is shown by adding to the nitric solution, diluted with water, a few drops of muriate of gold, which will cause a purple precipitate, the purple powder of Cassius.

Mercury may be purified, according to Berzelius, by digesting it with a small portion of nitric acid, or with a solution of bichloride of mercury (corrosive sublimate); whereby all the ordinary contaminating metals will be removed. This metal, however, is usually purified by distillation; and it is directed in the Pharmacopœias to be distilled for pharmaceutical use. (See *Hydrargyrum Purificatum.*)

Medical Properties. Mercury, in its uncombined state, is deemed inert; but in a state of combination, it acts on the living system as a peculiar and universal stimulant. Its combinations exhibit certain general medical properties and effects, which belong to the whole as a class; while each individual preparation is characterized by some peculiarity in its operation. Our business, in the present place, is to consider generally the physiological action of mercury, and the principles by which its administration should be regulated; while its effects, as modified in its different combinations, will more properly be noticed under the head of each preparation individually.

Of the modus operandi of mercury, we know nothing except that it probably acts through the medium of the circulation, and that it possesses a peculiar alterative power over the vital functions, which enables it in many cases to subvert diseased actions by substituting its own in their stead. This alterative power is sometimes exerted, without being attended with any other vital phenomenon than the removal of the disease; while at other times it is attended with certain obvious effects, indicative of the agency of a potent stimulus. In the latter case, its operation is marked by a quickened circulation, with a frequent, jerking pulse; by an increased activity imparted to all the secretory functions, particularly those of the salivary glands and the liver; by an exaltation of nervous sensibility; and, in short, by a general excitement of the organic actions of the system. When its effects are no otherwise obvious than in the subversion of disease, its operation, though so slight and imperceptible as altogether to escape notice, may be presumed to be the same as when it produces obviously stimulating effects.

When mercury acts insensibly as an alterative, there is not the least apparent disturbance of the circulation; but when it operates decidedly and obviously, it is very prone to let the brunt of its action fall upon the salivary glands, causing, in many instances, an immoderate flow of saliva, and constituting the condition denominated ptyalism or salivation. Under these circumstances, to the alterative effects of the mineral, are added those of depletion and revulsion. Occasionally its depletory action is exhibited in an increased secretion of urine, or an immoderate flow of the bile; and where ptyalism cannot be induced, and either of these secretions becomes considerably augmented, the circumstance may be held as equally conclusive of the constitutional impression of the mercury, as if the mouth had been affected.

Mercury has been used in almost all diseases, but too often empyrically, and without the guidance of any recognised therapeutic principle. Nevertheless, its efficacy in certain classes of diseases is universally acknowledged. In functional derangement of the digestive organs, mercurials in minute doses exert a salutary operation, subverting the morbid action, and that too by its insensible alterative effect, without affecting the mouth. In these cases no decided disturbance of the vital functions takes place; but the alvine discharges, if clay-coloured, are generally restored to their natural hue, a certain proof that the remedy is stimulating the liver, and promoting the secretion of the bile. Indeed there is no fact better established in medicine, than that of the influence of the mercurial preparations over the hepatic system; and whether the liver be torpid and obstructed as in jaundice, or pouring out a redundancy of morbid bile as in melæna, its judicious use seems equally efficacious in unloading the viscus, and restoring its secretion to a healthy state. In the acute and chronic hepatitis of India it is considered almost a specific; but here its use must be generally preceded by bleeding, and carried to the extent of exciting ptyalism. In chronic inflammation of the mucous and serous membranes, when accompanied by a feeble condition of the system, the alterative effects of mercury, are sometimes attended with much benefit. In many of these cases effusion has taken place; and under these circumstances the mercury often proves useful, by promoting the absorption of the effused fluid, as well as by removing the chronic inflammation on which its effusion depends. Hence it is that the remedy is often given with advantage in chronic forms of meningitis, bronchitis, pleuritis, pneumonia, dysentery, rheumatism, &c., and in hydrocephalus, hydrothorax, ascites, and general dropsy.

Mercury may also be advantageously resorted to in certain states of febrile disease. In some forms of the remittent fever of our own country, a particular stage of its course is marked by a dry tongue, torpor of the bowels, scanty urine, and an arid state of the surface. Here depletion by the lancet or leeches is often inadmissible, and the remedial measure most to be depended on is the judicious employment of mercury. It acts in such cases by increasing the secretions, and promoting the action of the exhalent capillaries, and, perhaps, by producing a new impression, incompatible with the action of the disease.

In syphilitic affections, mercury has been held to be, until of late years, an indispensable specific. Of its mode of action in these affections we know nothing, except that it operates by substituting its own peculiar action for that of the disease. Without entering upon the question of the necessity or non-necessity of mercury in venereal complaints, as out of place in this work, we are free to admit that the discussion which has grown out of it has shown that this remedy has sometimes been unnecessarily resorted to in affections resembling syphilis, though of a different character; and that the disease in question ought to be treated less empyrically, and more on the general principles of combating morbid action occurring in other parts. Mercury also appears to exert a peculiar control over the morbid effects of lead; and hence in colica pictonum, it is accounted by most writers to act almost as a specific.

For inducing the specific effects of mercury on the constitution, blue pill or calomel is generally resorted to. For producing what we have called the insensible alterative effects of the metal, a grain or two of blue pill may be given in the twenty-four hours, or from a sixth to a fourth of a grain of calomel; or if a gentle ptyalism be our object, from three to five grains of the former, or a grain of the latter, two or three times a day. Where the bowels are peculiarly irritable, it is often necessary to introduce the metal by means of frictions with mercurial ointment; and where a speedy effect is desired, the internal and external use of the remedy may be simultaneously resorted to.

The first observable effects of mercury in inducing ptyalism are a coppery taste in the mouth, a slight soreness of the gums, and an unpleasant sensation in the sockets of the teeth when the jaws are firmly closed. Shortly afterwards the gums begin to swell, a line of whitish matter is seen along their edges, and the breath is infected with a peculiar and very disagreeable smell, called the mercurial fetor. The saliva at the same time begins to flow; and if the affection proceeds, the gums, tongue, throat, and face are much swollen; ulcerations attack the lining membrane of the mouth and fauces; the jaws become excessively painful; the tongue is coated with a thick whitish fur; and the saliva flows in streams from the mouth. It occasionally happens, that the affection thus induced in the mouth proceeds to a dangerous extent, inducing extensive ulceration, gangrene, and even hemorrhage; when it will demand the attention of the practitioner. The best remedies are the various astringent and detergent gargles, used sufficiently weak, as the parts are in a state of extreme susceptibility. In cases attended with swelling and protrusion of the tongue, the wash is best applied by injection, by means of a large syringe. We have found lead-water among the best local applications in these cases; and dilute solutions of chloride of soda or of lime, while they correct the fetor and add to the comfort of the patient, will be found to exert a curative influence on the ulcerated surfaces.

In the foregoing observations we have described the ordinary effects of mercury; but occasionally, in peculiar constitutions, its operation is quite different, being productive of a dangerous disturbance of the vital functions. Mr. Pearson of London has given a detailed account of this occasional peculiarity in the operation of mercury in his work on the venereal disease. The symptoms which characterize it are a small frequent pulse, anxiety about the præcordia, pale and contracted countenance, great nervous agitation, and alarming general debility. Their appearance is the signal for discontinuing the mercury; as a further perseverance with it might be attended with fatal consequences. Mercury is also productive of a peculiar eruption on the skin, which will be found described by the systematic writers under the various names of *hydrargyria*, *eczema mercuriale*, and *lepra mercurialis*.

Pharmaceutical Preparations. We shall close our account of mercury by presenting a tabular view of all the preparations containing this metal, to be found in the United States and British Pharmacopœias. Mercury is officinal,—

I. IN THE METALLIC STATE.

- Hydrargyrum Purificatum, *U.S.*, *Lond.*, *Dub.;* Hydrargyrus Purificatus, *Ed.*
  - Emplastrum Hydrargyri, *U.S.*, *Lond.*, *Ed.*
  - Emplastrum Ammoniaci cum Hydrargyro, *Lond.*, *Dub.*
  - Hydrargyrum cum Calcis Carbonate, *U.S.;* Hydrargyrum cum Cretâ, *Lond.*, *Dub.*
  - Hydrargyrum cum Magnesiâ, *Dub.*
  - Pilulæ Hydrargyri, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Anglicè, *Blue pill.*
  - Unguentum Hydrargyri, *U. S.*, *Ed.*, *Dub.;* Unguentum Hydrargyri Fortius, *Lond.;* Anglicè, *Mercurial ointment.*
    - Unguentum Hydrargyri Mitius, *Lond.*, *Dub.*
    - Linimentum Hydrargyri, *Lond.*

II. PROTOXIDIZED.

(*By the action of solution of potassa on calomel.*)

- Hydrargyri Oxidum Nigrum, *U.S.*; Hydrargyri Oxydum Nigrum, *Dub.*

(*By the action of lime-water on calomel.*)

- Hydrargyri Oxydum Cinereum, *Lond.;* Oxidum Hydrargyri Cinereum, *Ed.*
  - Unguentum Oxidi Hydrargyri Cinerei, *Ed.*

III. PEROXIDIZED.

(*By the action of heat and air.*)

- Hydrargyri Oxydum Rubrum, *Lond.*, *Dub.;* Anglicè, *Red precipitate per se.*

(*By the action of nitric acid.*)

- Hydrargyri Oxidum Rubrum, *U.S.*; Hydrargyri Nitrico-oxydum, *Lond.*; Oxidum Hydrargyri Rubrum per Acidum Nitricum, *Ed.*; Hydrargyri Oxydum Nitricum, *Dub.;* Anglicè, *Red precipitate.*
  - Unguentum Hydrargyri Oxidi Rubri, *U.S.;* Unguentum Hydrargyri Nitrico-oxydi, *Lond.*; Unguentum Oxidi Hydrargyri Rubri, *Ed.;* Unguentum Hydrargyri Oxydi Nitrici, *Dub.*

IV. SULPHURETTED.

- Hydrargyri Sulphuretum Nigrum, *U.S.*, *Lond.*, *Dub.;* Sulphuretum Hydrargyri Nigrum, *Ed.*
- Hydrargyri Sulphuretum Rubrum, *U.S.*, *Lond.*, *Dub.;* Sulphuretum Hydrargyri Rubrum, *Ed.*

V. AS A PROTOCHLORIDE.

(*Obtained by sublimation.*)

- Hydrargyri Chloridum Mite, *U.S.;* Hydrargyri Submurias, *Lond.;* Sub-Murias Hydrargyri Mitis, sive Calomelas, *Ed.;* Calomelas Sublimatum, *Dub.;* Anglicè, *Calomel.*
  - Pilulæ Catharticæ Compositæ, *U.S.*
  - Pilulæ Hydrargyri Chloridi Mitis, *U.S.*
  - Pilulæ Hydrargyri Submuriatis Compositæ, *Lond.*; Pilulæ Sub-Muriatis Hydrargyri Compositæ, *Ed.*; Pilulæ Calomelanos Compositæ, *Dub.*

(*Obtained by precipitation.*)

- Calomelas Præcipitatum, *Dub.*; Sub-Murias Hydrargyri Præcipitatus, *Ed.*

VI. As a bichloride.

Hydrargyri Chloridum Corrosivum, *U. S.*; Hydrargyri Oxymurias, *Lond.;* Murias Hydrargyri Corrosivus, *Ed.;* Hydrargyri Murias Corrosivum, *Dub.;* Anglicè, *Corrosive sublimate.*
  Liquor Hydrargyri Oxymuriatis, *Lond.*
  Hydrargyrum Ammoniatum, *U.S.;* Hydrargyrum Præcipitatum Album, *Lond.;* Hydrargyri Submurias Ammoniatum, *Dub.;* Anglicè, *White precipitate.*
  Unguentum Hydrargyri Ammoniati, *U.S.;* Unguentum Hydrargyri Præcipitati Albi, *Lond.;* Unguentum Hydrargyri Submuriatis Ammoniati, *Dub.*

VII. Combined with cyanogen.

Hydrargyri Cyanuretum, *U.S.*, *Dub.*

VIII. Oxidized and combined with Acids.

Hydrargyri Acetas, *Dub.;* Acetas Hydrargyri, *Ed.*
Hydrargyri Persulphas, *Dub.*
Hydrargyri Sulphas Flavus, *U.S.;* Sub-Sulphas Hydrargyri Flavus, *Ed.;* Hydrargyri Oxydum Sulphuricum, *Dub.;* Anglicè, *Turpeth mineral.*
Unguentum Hydrargyri Nitratis, *U.S.*, *Lond.;* Unguentum Nitratis Hydrargyri Fortius, *Ed.;* Unguentum Hydrargyri Nitratis, vel Unguentum Citrinum, *Dub;* Anglicè, *Citrine ointment.*
Unguentum Nitratis Hydrargyri Mitius, *Ed.* B.

HYOSCYAMUS. *U. S.*

Henbane.

"Hyoscyamus niger. Folia. *The leaves.*" *U.S.*

Off. Syn. HYOSCYAMI FOLIA ET SEMINA. Hyoscyamus niger. Folia et semina. *Lond.;* HYOSCYAMI NIGRI HERBA. *Ed.*; HYOSCYAMUS NIGER. Folia. *Dub.*

Jusquiame noire, *Fr.;* Schwarzes Bilsenkraut, *Germ.;* Giusquiamo nero, *Ital.;* Beleno, *Span.*

Hyoscyamus. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Solaneæ. *Gen. Ch.* *Corolla* funnel-form, obtuse. *Stamens* inclined. *Capsules* covered with a lid, two-celled. *Willd.*

Hyoscyamus niger. Willd. *Sp. Plant.* i. 1010; Woodv. *Med. Bot.* p. 204. t. 76; Bigelow, *Am. Med. Bot.* i. 161. Henbane is a biennial plant, with a long, tapering, whitish, fleshy, somewhat branching root, bearing considerable resemblance to that of parsley, for which it has been eaten by mistake. The stem is erect, round, branching, from one to three feet in height, and thickly furnished with leaves. These are large, oblong ovate, deeply sinuated, with pointed segments, undulated, soft to the touch, and at their base embrace the stem. The upper leaves are generally entire. Both the stem and leaves are hairy, viscid, and of a sea-green colour. The flowers form long, one-sided, leafy spikes, which terminate the branches, and hang downwards. They are composed of a calyx with five pointed divisions, a funnel-shaped corolla, with five unequal, obtuse segments at the border, five stamens inserted into the tube of the corolla, and a pistil with a blunt, round stigma. Their colour is an obscure yellow, beautifully variegated with purple veins. The fruit is a globular two-celled capsule, covered with a lid, invested with the persistent calyx, and containing numerous small, irregular, brown or ash-coloured seeds, which are discharged by the horizontal separation of the lid. The whole plant has a rank offensive smell.

This species of Hyoscyamus is found in the northern and eastern sections of the United States, occupying waste grounds in the vicinity of the older settlements, particularly graveyards, old gardens, and the foundations of ruined houses. We have seen a specimen brought from the ruins of Ticonderoga. It is rare, however, in this country, of which it is not a native, having been introduced from Europe. In Great Britain, France, Germany, and other parts of Europe, it grows abundantly along the roads, around villages, amidst rubbish, and in uncultivated places. It flowers in June and July.

The *H. albus*, so named from the whiteness of its flowers, is used in France indiscriminately with the former species, which it resembles exactly in medicinal properties.

All parts of the *Hyoscyamus niger* are possessed of activity. The leaves only are considered officinal in the Pharmacopœias of the United States and Dublin; the leaves and seed have been adopted by the London College; and the whole herb by the College of Edinburgh. Much of the efficacy of henbane, depends upon the time at which it is gathered. The leaves should be collected soon after the plant has flowered. Those of the second year are asserted by Mr. Houlton to be greatly preferable to those of the first. The latter, he informs us, are less clammy and fetid, yield less extractive matter, and are medicinally much less efficient. As the plant is sometimes destroyed by the severe winters in England, no leaves of the second year's growth are obtainable, and the market is on these occasions supplied with the medicine of inferior quality. This is, perhaps, one of the causes of its great inequality of strength, and uncertainty of operation. (See *N. Am. Med. and Surg. Jour.* vol. ii. p. 484.) The root also is said to be much more poisonous in the second year than the first.

Properties. The recent leaves have, when bruised, a strong, disagreeable, narcotic odour, somewhat like that of tobacco. Their taste is mucilaginous, and very slightly acrid. When dried, they have little smell or taste. Thrown upon the fire, they burn with a crackling noise, as if they contained a nitrate, and at the same time emit a strong odour. Their virtues are completely extracted by diluted alcohol. The watery infusion is of a pale yellow colour, insipid, with the narcotic odour of the plant. The leaves have been analyzed by Lindbergsen, who obtained from them a narcotic principle. The seeds, analyzed by Brandes, yielded 24.2 per cent. of fixed oil, 1.4 of a solid fatty substance, traces of sugar, 1.2 of gum, 2.4 of bassorin, 1.5 of starch, 3.4 of a substance soluble in water, insoluble in alcohol, and precipitated by infusion of galls (phyteumacolla, *Brandes*), 4.5 of albumen soluble or coagulated, 26.0 of vegetable fibre, 24.1 of water, and 9.7 of saline matters, including an alkaline principle called *hyoscyamin* or *hyoscyamia*, combined with malic acid. This principle is obtained, according to Brandes, by precipitating with an alkali the decoction of the seeds, washing the precipitate, and treating it with alcohol. It crystallizes in long prisms, has a very strong taste, and forms crystallizable salts with sulphuric and nitric acids. These salts are said to have the same effect upon the pupil as the henbane itself. It is proper, however, to state that M. Chevallier, a very skilful analytical chemist of Paris, was unable to procure any of this supposed new alkaline principle; and MM. Brault and Poggiale, upon repeating the process of

Brandes, obtained only a powder consisting of salts of potassa, lime, and magnesia.*

Medical Properties and Uses. Hyoscyamus ranks among the narcotics. In moderate quantities it gently accelerates the circulation, increases the general warmth, occasions a sense of heat in the throat, and after a short period induces sleep. This action is sometimes attended with vertigo, pain in the head, and dilated pupils; and the medicine occasionally acts as a diaphoretic or diuretic, or even produces a pustular eruption. It does not constipate like opium, but, on the contrary, often proves laxative. In over doses it powerfully irritates the alimentary canal and brain, giving rise to pain in the bowels, diarrhœa, delirium or stupor, convulsions, great arterial prostration, petechiæ, and other alarming symptoms, which sometimes end in death. Dissection exhibits marks of inflammation of the stomach and bowels. The poisonous effects are best counteracted by emetics, and the subsequent use of acid drinks, such as lemon-juice and vinegar. Numerous instances might be adduced from authors to prove the deleterious influence of all parts of the *H. niger*, when taken in large quantities. Upon inferior animals its effects are not always the same. While it proves fatal to birds and dogs, the leaves are eaten with entire impunity by horses, cows, sheep, goats, and swine. It is not impossible that injury has in some cases resulted from the use of milk derived from cows or goats which had been feeding on henbane.

The remedial operation of hyoscyamus is anodyne and soporific. The medicine was known to the ancients, and was employed by some of the earlier modern practitioners; but had fallen into disuse, and was almost forgotten when Baron Störck again introduced it into notice. By this celebrated physician and some of his successors it was prescribed in numerous diseases, and, if we may credit their testimony, with the happiest effects; but subsequent experience of its operation has been such as very much to narrow the extent of its application. It is at present used almost exclusively to relieve pain, procure sleep, or quiet irregular nervous action; and is not supposed to exercise any specific curative influence over particular diseases. Even for the purposes which it is calculated to answer, it is infinitely inferior to opium or its preparations; and is generally resorted to only in cases in which the latter remedy is from peculiar circumstances deemed inadmissible. Hyoscyamus has one great advantage over opium in certain cases, that it has no tendency to produce constipation. The diseases to which it is applicable it would be useless to enumerate, as there are few complaints in which circumstances might not be such as to call for its employment. Neuralgic and spasmodic affections, rheumatism, gout, hysteria, and various pectoral diseases, as catarrh, pertussis, asthma, phthisis, &c. are among those in which it is most frequently prescribed. In Europe, where the fresh leaves are readily obtained, it is often applied externally in the shape of lotion, cataplasm, or fomentation to allay pain and irritation, in scrofulous or cancerous ulcers, scirrhous, hemorrhoidal, or other painful tumours, gouty and rheumatic swellings, and nervous headach. The smoke of the leaves or seeds has also been used in toothach; but the practice is deemed hazardous. The effect of henbane in dilating the pupil, when applied to the conjunctiva, has already been noticed. For this purpose it is used by European oculists, previously to the operation for cataract. An infusion of the leaves, or a solution of the extract is dropped into the eye. The effect is usually greatest at the end of four hours from the time of application, and in twelve hours ceases entirely. Vision is not impaired during its continuance. Reisinger recommends for this purpose a solution of hyoscyamia in the proportion of one grain to twenty-four of water, of which one drop is to be applied to the eye.

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* Geiger and Hesse have published a process by which they believe that they have succeeded in extracting an alkaline principle from the seeds of this species of Hyoscyamus. But the question of its existence may yet be considered as unsettled. For an account of the process of Geiger and Hesse, the reader is referred to the Journal of the Philadelphia College of Pharmacy, vol. vi. p. 318.

Henbane may be given in substance, extract, or tincture. The dose of the powdered leaves is from five to ten grains. The extract is exceedingly variable and precarious in its operation, being sometimes active, sometimes almost inert. The usual dose is one or two grains, repeated and gradually increased till the desired effect is obtained. Cullen rarely procured the anodyne operation of the medicine till he had carried the dose to eight, ten, or even fifteen or twenty grains. Collin pushed it to thirty-six grains; and Professor Fouquier, who experimented largely with hyoscyamus in the Hôpital de la Charité gave two hundred and fifty grains of the extract during twenty-four hours, without any specific or curative impression. (Richard, *Elem. Hist. Nat. Med.*) The extract here alluded to is the inspissated juice, prepared as directed by the Pharmacopœias. (See *Extractum Hyoscyami.*)

It is said by the French writers that the alcoholic extract, as prepared by M. Planche, is more certain and effectual. He directs one part of the plant to be macerated with four parts of alcohol for four days; three-fourths of the alcohol is then to be distilled, and the remaining fourth evaporated by a salt-water bath till the residue assumes the consistence of an extract. The preparation thus made has a fine green colour, and preserves the odour of the plant. The dose to begin with is one or two grains, which may be increased gradually to twenty or even thirty grains.

The dose of the tincture is one or two fluidrachms. A good plan in administering any of the preparations of hyoscyamus is to repeat the dose every hour or two till its influence is felt.

Off. Prep. Extractum Hyoscyami, *U.S.*, *Lond.*, *Ed.*, *Dub.*; Tinctura Hyoscyami, *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

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HYSSOPI OFFICINALIS HERBA. *Ed.*

Common Hyssop.

Hyssope, *Fr.*; Gemeiner Isop, *Germ.*; Issopo, *Ital.*; Hisopo, *Span.*

HYSSOPUS. *Sex. Syst.* Didynamia Gymnospermia.—*Nat. Ord.* Labiatæ.

Gen. Ch. *Corolla* lower lip three-parted, with a small intermediate subcrenate segment. *Stamens* straight, distant. *Willd.*

Hyssopus officinalis. Willd. *Sp. Plant.* iii. 47; Woodv. *Med. Bot.* p. 318. t. 113. This is a perennial plant, with numerous erect, quadrangular, somewhat branching stems, which are woody in their inferior portion, about two feet high, and furnished with opposite, sessile, lanceolate linear, pointed, punctate leaves. The flowers are violet coloured or blue, sometimes white, turned chiefly to one side, and arranged in half verticillated, terminal, leafy spikes. The upper lip of the corolla is roundish and notched at the apex, the lower is divided into three segments, of which the undermost is obovate.

Common hyssop is a native of the continent of Europe, where, as well as in this country, it is also cultivated in gardens. The flowering summits and leaves are the officinal parts.

They have an agreeable aromatic odour, and a warm, pungent, bitterish taste. These properties they owe to an essential oil, which may be obtained separate by distillation with water, and rises also with alcohol.

Medical Properties, &c. Hyssop is a warm gently stimulant aromatic, applicable to the same cases with the other labiate plants. Its infusion has been much employed in chronic catarrhs, especially in old people, and those of debilitated habit of body. It acts by facilitating the expectoration of the mucus which is too abundantly secreted. In this country, however, it is very seldom used by regular practitioners. W.

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ICHTHYOCOLLA. *U.S.*

Isinglass.

"Acipenser huso, et Acipenser Ruthenus. Vesica natatoria. *The swimming bladder.*" *U.S.*

Fish-glue; Ichthyocolle, colle de poisson, *Fr.;* Hausenblase, Fischleim, *Germ.;* Colla di pesce, *Ital.;* Cola de pescado, *Span.*

Isinglass is a gelatinous substance, prepared chiefly from the sounds or swimming bladders of fishes, especially those of different species of sturgeon. Though no longer retained by any of the British Colleges in their officinal catalogues, it still has a place in the Pharmacopœia of the United States, and being universally kept in the shops, requires at least a brief notice in the present work.

In most fishes there is a membranous bag, placed in the anterior part of the abdomen, communicating frequently, though not always, by means of a duct, with the œsophagus or stomach, and containing usually a mixture of oxygen and nitrogen gases in various proportions. From the supposition that it was intended by its expansion or contraction to enable the fish to rise or sink in the water, it has been denominated *swimming bladder.* It is of different shape in different fishes, and consists of three coats, of which the two interior are thin and delicate, the outer tough and of a silvery whiteness.

The *Acipenser Huso* or *beluga* of the Russians, and the *A. Ruthenus* or sterlet, are designated by the Pharmacopœia as the species of sturgeon from which isinglass is procured; but two others, the *A. Sturio* or common sturgeon, and *A. stellatus*, or starred sturgeon, also furnish large quantities to commerce. All these fish inhabit the interior waters of Russia, especially the Wolga, and other streams which empty into the Caspian Sea. Immense quantities are annually taken and consumed as food by the Russians. The air-bags are removed from the fish, and having been slit open and washed in water in order to separate the blood, fat, and adhering extraneous membranes, are spread out, and when sufficiently stiffened, are formed into cylindrical rolls, the ends of which are brought together and secured by pegs. The shape given to the roll is that of a staple, or more accurately that of a lyre, which it firmly retains when dried. Thus prepared it is known in commerce by the name of *staple isinglass*, and is distinguished into the *long* and *short staple.* Sometimes the membranes are dried in a flat state, or simply folded, and then receive the name of *leaf* or *book isinglass.* The scraps or fragments of these varieties, with various other parts of the fish, are boiled in water, which dissolves the gelatin, and upon evaporation leaves it in a solid state. This is called *cake isinglass*, from the shape which it is made to assume. It is sometimes, however, in globular masses. Of these varieties the *long staple* is said to be the best; but the finest *book isinglass* is not surpassed by any brought to this country. That in *cakes* is brownish, of an unpleasant odour, and employed only in the arts. Inferior kinds, with the same commercial titles, are said to be prepared from the peritoneum and intestines of the fish.

Isinglass little inferior to the Russian is made in Iceland, from the sounds of the cod and ling.

We receive from Brazil the air-bladders of a large fish, prepared by drying them in their distended state. They are oblong, tapering and pointed at one end, bifid with the remains of their pneumatic duct at the other, and of a firm consistence.

Isinglass of good quality is now obtained in New York from the weak fish—*Labrus Squeteague* of Mitchell—and perhaps others caught in the neighbourhood. The sounds are dried whole, or merely slit open, and vary much in size and texture, weighing from a drachm up to an ounce.

Another kind, of inferior quality, is prepared in New England, from the intestines of the *Gadus Morrhua* or cod-fish. It is in the form of thin ribbands, several feet in length, and from an inch and a half to two inches in width. It has been used to a considerable extent in this country; but is less soluble than the Russian, and affords a dark coloured solution.*

Isinglass is sometimes kept in the shops cut into fine shreds, and is thus more easily acted on by boiling water.

In its purest form it is whitish, semi-transparent, of a shining, pearly appearance, and destitute of smell and taste. The inferior kinds are yellowish and more opaque. In cold water it softens, swells up, and becomes opalescent. Boiling water entirely dissolves it, with the exception of a minute proportion of earthy impurities, amounting, according to Mr. Hatchet, to less than two parts in the hundred. The solution on cooling assumes the form of a jelly, which consists of pure gelatin and water. Isinglass is in fact the purest form of *gelatin* with which we are acquainted, and may be used whenever this principle is required as a test. It is insoluble in alcohol, but is dissolved readily by most of the diluted acids, and by the liquid alkalies. It has a strong affinity for tannin, with which it forms an insoluble compound. Boiled with concentrated sulphuric acid, it is converted into a peculiar saccharine matter. Its aqueous solution speedily putrefies.

Medical Properties and Uses. Isinglass has no peculiar medical properties. It may be given internally, in the form of jelly, as a highly nutritious article of diet; but it has no advantages over the jelly prepared from calves-feet. Three drachms impart sufficient consistence to a pint of water. It is employed in the arts for clarifying liquors, and imparting lustre to various woven fabrics. Added in small quantity to vegetable jellies, it gives them a tremulous appearance, which they want when unmixed. As a test of tannin it is used in solution, in the proportion of a drachm to ten fluidounces of distilled water. It forms the basis of the English court-plaster.

W.

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* See a paper on Ichthyocolla by Daniel B. Smith in the Journ. of the Phil. Col. of Pharm. III. 17 and 92, from which we have derived the facts in relation to American isinglass; also a communication from Dr. J. V. C. Smith of Boston, in the same Journal, VI. 12.

INULA. *U.S. Secondary.*

Elecampane.

"Inula helenium. Radix. *The root.*" *U. S.*

Off. Syn. HELENIUM. Inula Helenium. Radix. *Lond.;* INULA HELENIUM. Radix. *Dub.*

Aunée, *Fr.;* Alantwurzel, *Germ.;* Enula campana, *Ital.*, *Span.*

INULA. *Sex. Syst.* Syngenesia Superflua.—*Nat. Ord.* Compositæ Corymbiferæ.

Gen. Ch. Receptacle naked. *Seed-down* simple. *Anthers* ending in two bristles at the base. *Willd.*

Inula Helenium. Willd. *Sp. Plant.* iii. 2089; Woodv. *Med. Bot.* p. 64. t. 26. Elecampane has a perennial root, and an annual stem which is round, furrowed, villous, leafy, from three to six feet high, and branched near the top. The leaves are large, ovate, serrate, crowded with reticular veins, smooth and deep green upon the upper surface, downy on the under, and furnished with a fleshy midrib. Those which spring directly from the root are petiolate, those of the stem sessile and embracing. The flowers are large, of a golden yellow colour, and stand singly at the ends of the stem and branches. The calyx exhibits several rows of imbricated ovate scales. The florets of the ray are numerous, spreading, linear, and tridentate at the apex. The seeds are striated, quadrangular, and furnished with a simple, somewhat chaffy pappus.

This large and handsome plant is a native of Europe, where it is also cultivated for medical use. It has been introduced into our gardens, and has become naturalized in some parts of the country, growing in low meadows, and on the road sides, from New England to Pennsylvania. It flowers in July and August. The roots, which are the officinal part, should be dug up in autumn, and in the second year of their growth. When older they are apt to be stringy and woody.

The fresh root of elecampane is very thick and branched, having whitish cylindrical ramifications which are furnished with thread-like fibres. It is externally brown, internally whitish and fleshy; and the transverse sections present radiating lines. The dried root, as found in the shops, is usually in longitudinal or transverse slices, and of a grayish colour internally. The smell is slightly camphorous, and, especially in the dried root, agreeably aromatic. The taste, at first glutinous and said to resemble that of rancid soap, becomes, upon chewing, warm, aromatic, and bitter. Its medical virtues are extracted by alcohol and water, the former becoming most strongly impregnated with its bitterness and pungency. A peculiar principle resembling starch was discovered in elecampane by Rose, a chemist of Berlin, who named it *alantin;* but the title *inulin*, proposed by Dr. Thomson has been generally adopted. It differs from starch in being precipitated unchanged from its solution in boiling water when the liquor cools, and in not affording a blue colour with iodine. It has been found in the roots of several other plants. Besides this principle, elecampane contains, according to John, a white, concrete substance, called *helenin*, intermediate in its properties between the essential oils and camphor, and separable by distillation with water; a bitter extractive, soluble in water and alcohol; a soft, acrid, bitter resin, having an aromatic odour when heated; gum; albumen; lignin; traces of volatile oil; a little wax; and various saline substances.

Medical Properties and Uses. Elecampane is tonic and gently stimulant, and has been supposed to possess diaphoretic, diuretic, expectorant, and emmenagogue properties. By the ancients it was much employed, especially in the complaints peculiar to females; and it is still occasionally resorted to in cases of retained or suppressed menstruation. In this country it is chiefly used in chronic diseases of the lungs, and is sometimes beneficial when the affection of the chest is attended with weakness of the digestive organs, or with general debility. From a belief in its deobstruent and diuretic virtues, it was formerly prescribed in chronic engorgements of the abdominal viscera, and the dropsy to which they so often give rise. It has also been highly recommended both as an internal and external remedy in tetter, psora, and other diseases of the skin. The usual modes of administration are in powder and decoction. The dose of the former is from a scruple to a drachm. The decoction may be prepared by boiling half an ounce of the root in a pint of water, and given in the dose of one or two fluidounces.

Off. Prep. Confectio Piperis Nigri, *Lond.*, *Dub.* W.

IODINUM. *U.S.*

Iodine.

Off. Syn. IODINIUM. *Dub.*

Iode, *Fr.;* Iod, *Germ.;* Iodina, *Ital.*, *Span.*

Iodine was discovered in 1812 by Courtois, a soda manufacturer of Paris. Its nature was immediately investigated by Sir H. Davy and Gay-Lussac; but particularly by the latter, who presented to the scientific world a very complete chemical history of it, pointed out its analogy to chlorine, and showed the great probability of its simple nature. Its powers as a therapeutic agent were shortly afterwards tried; and these being found valuable, it came into use with many practitioners. In 1826 it was introduced very properly into the officinal catalogue of the revised edition of the Dublin Pharmacopœia, and in 1830 into that of the United States. As yet it has not been recognised by the London or Edinburgh College.

Natural State and Preparation. Iodine exists naturally in certain marine vegetables, particularly the fuci or common sea-weeds; in the animal kingdom, in sponge, the oyster, various polypi, and other sea animals; and in the mineral kingdom, in sea water in minute quantity, in certain salt springs, and united with silver in a rare Mexican mineral. It was first discovered in the United States in the water of the Congress Spring, at Saratoga, by Dr. William Usher; and afterwards in the same water by Dr. J. H. Steel, who ascertained it to be in the state of hydriodate of soda. (See *Aqua*, p. 99.) It has also been detected in small quantity in the Kenhawa saline waters, by Professor Emmet of the University of Virginia. When in solution, it always occurs in union with hydrogen and a base as a hydriodate. In sea-weeds, according to Gaultier de Claubry, it exists in the state of hydriodate of potassa; and it is from the ashes of these that iodine is most readily obtained. Berzelius conceives the iodine to exist in these ashes as a hydriodate of soda. In both England and France, sea-weeds are burnt for the sake of the carbonate of soda contained in their ashes. In England the incinerated product is called *kelp*, in France, *vareck;* and it contains, besides carbonate of soda, the iodine which pre-existed in the weeds. The manner in which kelp is treated, in order to obtain the iodine, is to act upon it with cold water, and to concentrate the solution obtained till a pellicle is formed, when it is allowed to crystallize. By this treatment, nearly all the carbonate of soda and chloride of sodium, (common salt,) are separated, and the uncrystallizable residue consists almost exclusively of a solution of hydriodate of potassa. This is then mixed in a retort with an excess of strong sulphuric acid, and, when the effervescence has ceased, with a portion of peroxide of manganese in fine powder. A receiver is now adapted to the retort, and heat applied. The sulphuric acid unites with the potassa, and disengages the hydriodic acid, which is instantly decomposed; its hydrogen uniting with the oxygen of the peroxide, and the liberated iodine being driven over by the heat, and condensed in the receiver. The process may be conducted without the manganese, in which case, the hydriodic acid is deprived of its hydrogen by part of the sulphuric acid, which in consequence becomes converted into sulphurous acid; but the process conducted in this manner is less eligible than the other, as the hydriodic acid is less completely decomposed. The iodine as thus obtained is contaminated with some acid, and may be purified by washing it, and afterwards redistilling it from a weak solution of potassa. It may then be dried by pressing it between folds of bibulous paper, and must be kept in glass stoppered bottles, as corks are quickly corroded.

Properties. Iodine is a soft, friable, opaque, elementary solid, in the form of crystalline scales of a blueish-black colour and metallic lustre. It possesses a strong and peculiar odour, analogous to that of chlorine, and an acrid taste. Applied to the skin, it produces an evanescent yellow stain. Its sp. gr. is a little less than 5; its fusing point, 225°; and boiling point, 347°. It is a volatile substance, and evaporates even at common temperatures, provided it be in a moist state. As it occurs in commerce, it generally contains twelve per cent. of water. Its vapour has a rich purple colour, a property which suggested its name, and a sp. gr. of 8.7, being the heaviest aëriform substance known. When it comes in contact with cool surfaces, it condenses in brilliant steel-gray crystals. Iodine is soluble in 7000 times its weight of water, and in a much smaller quantity of alcohol or ether. Its solution in the former has no taste, a feeble odour, and a light brown colour; in the latter, it possesses a deep brown hue. Its solubility in water is very much increased by the addition of certain salts, as the chloride of sodium, nitrate of ammonia, or iodide of potassium. In chemical habitudes, it resembles chlorine; but its affinities are much weaker. Its equivalent number is 126.3. It combines with most of the non-metallic, and nearly all the metallic, bodies, forming, when the combination is not acid, the class of compounds called *iodides*. Some of these, as the iodides of potassium, mercury, and lead, are used in medicine. (See *Potassii Iodidum.*) It forms with oxygen, one oxide, and three acids, the *iodous*, *iodic* and *periodic acid*, and with hydrogen, a gaseous acid, analogous in properties and constitution to the muriatic, called *hydriodic acid.*

Iodine may, in most cases, be recognised by the appearance of its characteristic purple vapour; but where this cannot be made evident, it is detected unerringly by starch, which produces with it an insoluble combination of a deep blue colour. This test was discovered by Colin and Gaultier de Claubry, and, according to Stromeyer, is so delicate, that it will indicate the presence of iodine contained in 450,000 times its weight of water. In order that the test may succeed, the iodine must be in a free state, and the solutions cold. To render it free where it happens to be in saline combination, a little nitric acid must be added to the solution suspected to contain it.

Iodine has been occasionally adulterated with animal charcoal and peroxide of manganese. The presence of these substances is easily discovered by exposing the suspected iodine to heat, when they will remain behind. Of latter years, however, iodine has fallen so much in price, that the motive for these frauds is very much lessened.

Medical Properties and Uses. Iodine was first employed as a medicine, for the cure of goitre, by Dr. Coindet of Geneva. It operates as a general excitant of the living actions, but particularly of the absorbent and glandular systems; and is capable of producing very important alterative effects. It appears to act by entering into the circulation. Its most constant effect is to excite the digestive organs, as shown by its increasing the appetite; and in some instances it proves powerfully diuretic. Salivation is occasionally induced by it, and this effect is more apt to occur in males than in females. Notwithstanding, it has been recommended as a remedy in cases of severe salivation, given in doses of two grains daily increased to four, in a vehicle composed of cinnamon water and simple syrup. (*Am. Journ. of Med. Sci., from Hufeland*, xiii. 533.) When taken in an overdose it acts as an irritant poison. In doses of two drachms administered to dogs, it produced irritation of the stomach, and death in seven days; and the stomach on dissection was found studded with numerous little ulcers of a yellow colour. In a dose of from four to six grains in man, it produces a sense of constriction in the throat, sickness and pain at the stomach, and at length vomiting and colic. These facts demonstrate the activity of iodine, and show the necessity of caution in its exhibition. When given in incautious doses, or too long continued, it sometimes produces unpleasant and even dangerous symptoms; such as restlessness, palpitation, a sense of burning along the gullet, excessive thirst, acute pain in the stomach, vomiting and purging, violent cramps, rapid and extreme emaciation, and frequent pulse. But these results can only take place from great and culpable negligence on the part of the practitioner; for upon the appearance of the first symptoms of fever or general nervous disturbance, the remedy ought instantly to be laid aside. Dr. Lugol of Paris, who has used iodine more extensively and methodically than any other practitioner, has never observed any alarming effects to arise from its exhibition in the small doses in which he is in the habit of giving it. He has not found it to cause emaciation, hæmoptysis, pulmonary tubercles, or the other bad effects so frequently attributed to it. On the contrary, in the hospital of Saint Louis, the theatre of his extensive experience, many of the patients gained flesh and improved in health.

Iodine has been principally employed in diseases of the absorbent and glandular systems. In ascites it has been used with success by Dr. Baron, an English practitioner. It is said not to act efficaciously while the abdomen is tense, and the absorbents consequently compressed; but operates only after this state of things is removed by tapping. It has also been recommended in ovarian dropsy. In glandular enlargements its use has proved more efficacious than perhaps in any other class of diseases. Dr. Coindet discovered its extraordinary power in promoting the absorption of the thyroid gland, in the disease called bronchocele; and it has also been used with more or less success in enlargements of the liver, spleen, mammæ, testes, and uterus. Its emmenagogue power has been noticed by several practitioners; and Dr. Lugol mentions several instances, among his scrofulous patients, in which it cured obstructed and painful menstruation. It has been recommended in leucorrhœa (*N. Am. Arch.* I. 218), and has been found useful in gonorrhœa and gleet. In certain diseases of the nervous system also, iodine has proved useful in the hands of some practitioners. Dr. Manson, of Nottingham, England, in his work, published in 1825, on the medical effects of iodine, has recorded cases of its efficacy in chorea, paralysis, and deafness. It is, however, in scrofulous diseases that the most interesting trials have been made with this remedy; and there is not wanting authentic testimony of its efficacy in these affections. Dr. Coindet and Sir Andrew Halliday have both prescribed it with benefit; and Dr. Manson reports a number of cases of scrofulous disease, in the form of enlarged glands, ulcers, and ophthalmia, occurring in his practice between 1821 and 1824, in a large proportion of which the disease was either cured or meliorated, and the general health very much improved. We are indebted, however, to Dr. Lugol for the most extended and valuable researches on the use of iodine in the different forms of scrofula. This physician began his trials with the remedy in the hospital Saint Louis in 1827, and made known his results in three Memoirs published in 1829–30 and 31. These memoirs give the details of a success which would stagger belief, were the cases not substantiated by two committees of distinguished physicians of the French Royal Academy of Sciences. The scrofulous affections in which Dr. Lugol succeeded by the administration of iodine were glandular tubercles, especially of the neck, ophthalmia, ozæna, noli me tangere (dartre rongeante scrophuleuse), and fistulous and carious ulcers. He also obtained favourable results in some cases of scrofulous syphilis by the use of the iodide of mercury. In connexion with Dr. Lugol's results in scrofulous affections, it may be proper to mention that Dr. Manson derived benefit from the use of iodine in white swelling, hip-joint disease, and distortions of the spine, diseases generally admitted to be more or less dependent on a scrofulous taint.

Iodine is employed both internally and externally. Internally it is generally used in the form of tincture, and externally in combination, in the form of iodide of potassium, or of iodide of mercury or lead. Dr. Lugol objects to the tincture as of unequal strength, and as being liable to have the iodine precipitated by water on the surface of the stomach, where it is apt to produce too irritating an action. This physician prefers a mixed solution of iodine and iodide of potassium in distilled water; the iodide being employed merely for the purpose of dissolving the iodine more completely. He employs three strengths, namely three-fourths of a grain, one grain, and a grain and a quarter of iodine to half a pint of distilled water; the quantity of iodide of potassium being in each solution double the quantity of the iodine.* These solutions are permanent, perfectly transparent, and of an orange colour. The mode of administration employed by Dr. Lugol is to give at first two-thirds of the weakest solution, or half a grain of iodine daily for the first fortnight; the weakest solution entire for another fortnight; the medium solution during the fourth and fifth fortnight; and lastly, in some cases, the strongest solution for the remainder of the treatment. In the majority of cases, however, he had not occasion to resort to the strongest solution. He gives half the daily quantity in the morning fasting, and the other half, an hour before dinner; each portion being slightly sweetened at the moment of taking it. For the convenience of making the weak iodine solution, or of administering the remedy by drops, Dr. Lugol prepares a concentrated solution, consisting of a scruple of iodine, and two scruples of iodide of potassium dissolved in seven fluidrachms of water.† Of this solution the dose is six drops twice a day (in the morning fasting, and an hour before dinner) in a glass of sweetened water, gradually increased weekly by two drops at a time, until the dose reaches to thirty or thirty-six drops. For children under seven years, the dose is two drops twice a day, gradually increased to five. It will be observed that these doses are considerably less than those usually employed on the recommendation of Dr. Coindet.

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* In the original, the grains are French, and the quantity of water eight French ounces; but to facilitate prescription we have supposed them English grains, and have substituted half a pint for the eight French ounces of water; changes which will not make the solutions materially stronger.

† In the original it is *seven ounces;* but from the context of the author, this is evidently a misprint for *seven drachms.*

The external treatment by iodine may be divided into local and general. By its use in this way it does not create a mere topical effect on the skin; but by its absorption produces its peculiar constitutional impression. Dr. Lugol has given a number of formulæ for preparations for the local use of iodine, a short account of which will be presented in this place. His *iodine ointment* varies in strength from six to twelve grains of iodine, mixed with from two to four scruples of iodide of potassium, to the ounce of lard. It has a mahogany colour. He employs it in frictions to scrofulous tumours, and as a dressing to scrofulous ulcers. The *ointment of protiodide of mercury* which he recommends, consists of from one to two scruples of the mercurial iodide to the ounce of lard. Its proper colour is canary yellow; but occasionally it has a decided greenish tint, derived from the presence of protoxide of mercury, or an orange colour, when it contains the biniodide. This ointment, which has the advantage of producing very little pain, is used by Dr. Lugol in noli me tangere, and in all scrofulous ulcers which have a syphilitic aspect. Dr. Lugol's *iodine lotion* consists of from two to four grains of iodine to a pint of distilled water, the solution being rendered complete by the addition of double the quantity of iodide of potassium. This is used by injection principally in scrofulous ophthalmia, ozæna, and fistulous ulcers. A *rubefacient solution* may be formed by dissolving half an ounce of iodine and an ounce of iodide of potassium in six fluidounces of distilled water. This is useful for exciting scrofulous ulcers, for touching the eye-lids, and as an application to recent scrofulous cicatrices, to render them smooth and less prominent. A certain quantity of the rubefacient solution added to warm water, makes a convenient local bath for the arms, legs, feet, or hands; and mixed with linseed meal, or some similar substance, it forms a cataplasm, useful in particular cases, especially where the object is to promote the falling off of scabs. The only remaining local application to be mentioned, is what Dr. Lugol calls *iodine caustic.* It consists of iodine and iodide of potassium, each an ounce, dissolved in two ounces of distilled water, and is used to stimulate or destroy soft and fungous granulations. Its employment in this way has been attended with particularly good effect in noli me tangere.

The external application of iodine when general, consists in the use of iodine baths, a mode of applying the remedy which originated with Dr. Lugol. This mode of administration is considered very valuable by this physician, on account of the great extent of the skin, which furnishes the means of introducing a considerable quantity of iodine into the circulation, without deranging the digestive functions, an object of great importance, where the medicine produces peculiar irritation of the stomach. The iodine bath for adults, according to the formula of Dr. Lugol, should contain from two to four drachms of iodine, with double that quantity of iodide of potassium, dissolved in water, in a *wooden* bath tub, the proportion of the water being about a gallon for every three grains of iodine employed. The quantity of ingredients for the baths of children is one-third as much as for adults, but dissolved in about the same proportional quantity of water. The quantity of iodine and iodide for a bath being determined on, it is best to dissolve them in a small quantity of water, (half a pint for example,) before they are added to the water of the bath; as this mode of proceeding facilitates their thorough diffusion. In the composition of these baths, the iodide of potassium is used by Dr. Lugol, merely to promote the solubility of the iodine, and not as a medicinal agent; as upon trial, a bath containing it alone proved nearly inert.

The iodine baths, which may be directed three or four times a week, usually produce a slight rubefacient effect, but occasionally, a stronger impression, causing the epidermis to peel off, particularly of the arms and legs. The skin at the same time contracts a deep yellow tinge, which usually disappears in the interval between the baths.

Since the publication of Dr. Lugol's memoirs, detailing his success with iodine in the treatment of scrofulous affections, even of the most unpromising aspect, his practice has been imitated and extended by several practitioners, and generally with encouraging results. Dr. Bermond, of Bordeaux, has succeeded with the iodine treatment in enlarged testicle from a venereal cause, scrofulous ophthalmia of six years' duration, and scrofulous ulcers and abscesses of the cervical and submaxillary glands. In numerous other cases of scrofula under his care, the iodine treatment proved beneficial, though before its commencement, the cases underwent no improvement. The only peculiarity in Dr. Bermond's treatment, was that, in some cases, he associated opiate preparations with the iodine. In the case of ophthalmia which he treated, the collyrium employed consisted of tincture of iodine thirty drops, laudanum thirty-six drops, to four fluidounces of distilled water. When the local application of the iodine created much pain or rubefaction, he advantageously combined extract of opium with it. A plaster which he found efficacious as an application to the enlarged parotid, in one of his cases, consisted of lead plaster (diachylon) and iodide of potassium, (hydriodate of potassa,) each, four parts; iodine and extract of opium, each, three parts. In confirmation of Dr. Bermond's views, M. Lemasson, one of the house pupils of the hospital St. Louis, has published a number of cases proving the efficacy of a combination of iodine and opium, in the local treatment of scrofulous ulcerations. He concludes from his experience that the union of opiate preparations with iodine imparts to the latter, in many cases, new and valuable powers. One of the combinations which he employed consisted of iodine *fifteen grains*, iodide of potassium *a drachm*, Rousseau's laudanum, *two drachms*, mixed up into an ointment with fresh lard *two ounces*.

Besides the *protiodide* of mercury, already mentioned as used by Dr. Lugol in scrofulous syphilis, the *biniodide* of this metal has been resorted to in similar cases with apparent advantage. The latter preparation must be used with caution, on account of its comparative strength; as it contains a double proportion of iodine, and bears the same chemical relation to the protiodide as corrosive sublimate does to calomel. The average dose of the protiodide is two grains daily, carried usually to the extent of salivation; of the biniodide, from the eighth to the sixth of a grain, three times a day. The ointment of the biniodide of mercury may be made of about the same strength as that of protiodide, already mentioned.

The last preparation of iodine to be noticed in this place is the *protiodide of lead.* This compound was introduced as a remedy for scrofulous swellings and ulcerations by two Parisian physicians, MM. Cottereau and De Lisle, and has been employed at the Hôpital des Enfans, and at La Pitié by Guersent and Velpeau with striking success. The remedy was used internally, and at the same time by frictions on the tumors. The dose is from a quarter to half a grain, repeated several times a day. The ointment is formed by rubbing up a drachm of the iodide with an ounce of lard.

As the iodine compounds last mentioned are not officinal, it may be useful to give an outline of the mode in which they are prepared. The *protiodide of mercury* is formed by precipitation, by adding a solution of hydriodate of potassa (iodide of potassium dissolved in water) to a solution of the *proto*nitrate of mercury; and the *biniodide*, in a similar manner, by the addition of the hydriodate to a solution of corrosive sublimate. Both cases are instances of double decomposition; and the difference in the precipitate depends entirely on the state of oxidation of the metal in the mercurial salt employed. The protiodide is canary yellow, the biniodide, of a beautiful carmine red tint. In preparing the latter, it is necessary to add the hydriodate drop by drop, as the precipitate is soluble in an excess of either of the salts employed in its formation. The *protiodide of lead* is formed by adding a solution of iodide of potassium to a solution of nitrate of lead. Protiodide of lead precipitates, and nitrate of potassa remains in solution. This iodide is of a fine yellow colour, soluble in 1235 parts of cold, and in 194 parts of boiling water, from which latter upon cooling it crystallizes in brilliant yellow hexagonal plates. It is capable of uniting in three proportions with the protoxide of lead, forming pulverulent *insoluble* oxy-iodides which must not be confounded with the pure iodide, which alone has been used for medicinal purposes. Its freedom from the oxy-iodides is readily ascertained by the action of boiling water, which takes up the whole of it when pure, and deposites it again, on cooling, in crystals, having the characteristic appearance above mentioned. The oxy-iodides, if present, will be left as an insoluble residue. (See the paper of M. Denot on the iodides of lead, *Journ. de Pharm.* xx. 1.)

The results obtained by Dr. Lugol and others in the treatment of scrofulous diseases by the iodine preparations are now so diversified, as to leave no doubt of their superiority over all the remedies heretofore used in the same class of affections. A considerable number of practitioners in the United States have employed them in the same diseases with encouraging success; but at the same time, there have been, as was to be expected in the treatment of so obstinate a disease, a number of failures. To judge fairly, however, of Dr. Lugol's remarkable results, it is not sufficient for our practitioners to use iodine; but they should use it in the peculiar manner, and with the observance of all the rules, which are so fully laid down in the published memoirs of this physician. Reasoning on the subject, we can readily conceive that a dilute aqueous solution of iodine may act differently from the tincture; and that a therapeutical agent may be introduced gradually and imperceptibly into the current of the circulation in one form of administration, and thus be capable of producing important alterative effects; while in another, it may create irritation and even ulceration of the stomach, and fail to be absorbed. A case in point is furnished by mineral waters, which, though generally containing a minute portion of saline matter, often produce remedial effects which cannot be obtained by their constituents given in larger doses.*

Off. Prep. Potassii Iodidum, *U.S.*, *Dub.*; Tinctura Iodini, *U.S.*, *Dub.*; Unguentum Iodinii, *Dub.* B.

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* For further details, the reader is referred to the work of Dr. Lugol, "Sur l'Emploi de l'Iode dans les Maladies Scrofuleuses," or its Translation, with valuable additions, by Dr. O'Shaughnessy, of London. For a notice of the iodides of iron, sulphur, and zinc, and of the iodohydrargyrate of potassium, see APPENDIX.

IPECACUANHA. *U.S.*

Ipecacuanha.

"Cephaëlis ipecacuanha. *Richard.* Callicocca ipecacuanha. *Brotero.* Radix. *The root.*" *U.S.*

Off. Syn. IPECACUANHÆ RADIX. Callicocca Ipecacuanha. Radix. *Lond.;* IPECACUANHÆ RADIX. *Ed.;* CEPHAELIS IPECACUANHA. Radix. *Dub.*

Ipecacuanha, *Fr.;* Brechwurzel, Ipecacuanha, *Germ.;* Ipecacuana, *Ital., Span.*

The term *ipecacuanha*, derived from the language of the South American Indians, has been applied to various emetic roots of American origin. The British Colleges and our national Pharmacopœia recognise only that of the *Cephaëlis Ipecacuanha;* and no other is known by the name in the shops of this country. Our chief attention will, therefore, be confined to this root, and the plant which yields it; but as others are employed in South America, are occasionally exported, and may possibly reach our markets mingled with the genuine drug, we shall, after treating of the true ipecacuanha; give a succinct account of the different varieties, as described by the authors who have most recently written on the subject.

The botanical character of the plant which yields genuine ipecacuanha was long unknown. Pison and Marcgrav, who were the first to notice this medicine, in their work on the natural history of Brazil, published at Amsterdam, A.D. 1648, describe in general terms two plants, one producing a whitish root, distinguished by the name of white ipecacuanha, the other a brown root which answers in their description precisely to the officinal drug. But their account was not sufficiently definite to allow botanists to decide upon the character of the plants; and much uncertainty existed on the subject. The medicine was generally thought to be derived from a species of *Viola*, which Linnæus designated by the title of *V. Ipecacuanha.* Opinion afterwards turned in favour of a plant sent to Linnæus by the celebrated Mutis from New Granada, as affording the ipecacuanha of that country and of Peru. This was described in the *Supplementum* of the younger Linnæus, A.D. 1781, under the name of *Psychotria emetica*, and was long erroneously considered as the source of the true ipecacuanha. Dr. Gomez of Lisbon was the first who accurately described and figured the genuine plant, which he had seen in Brazil, and specimens of which he took with him to Portugal; but Brotero professor of botany at Coimbra, with whom he had left specimens, having drawn up a description, and had it inserted with a figure in the Linnean Transactions, without acknowledgment, has generally enjoyed the credit due to his fellow countryman.* In the paper of Brotero the plant is named *Callicocca Ipecacuanha;* but the term *Callicocca* having been applied by Schreber, without sufficient reason, to a genus previously established and named, has been universally abandoned by botanists for the *Cephaëlis* of Swartz, though this also, it appears, is a usurpation upon the previous rights of Aublet.

Cephaelis. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Rubiaceæ, *Juss.;* Cinchonaceæ, *Lindley.*

Gen. Ch. *Flowers* in an involucred head. *Corolla* tubular. *Stigma* two-parted. *Berry* two-seeded. *Receptacle* chaffy. *Willd.*

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* The memoir of Gomez appeared in Lisbon A.D. 1801; the paper of Brotero was published in the sixth volume of the Linnean Transactions of London, which did not appear till the year 1802.

Cephaëlis Ipecacuanha. Richard, *Hist. Ipecac.* p. 21. t. i.; Martius, *Spec. Mat. Med. Brazil.* p. 4. t. i.—*Callicocca Ipecacuanha.* Brotero, *Linn. Trans.* vi. 137. This is a small shrubby plant, with a root from four to six inches long, about as thick as a goose-quill, marked with annular rugæ, simple or somewhat branched, descending obliquely into the ground, and here and there sending forth slender fibrils. The stem is two or three feet long; but being partly under ground, and often procumbent at the base, usually rises less than a foot in height. It is slender; in the lower portion leafless, smooth, brown or ash-coloured, and knotted, with radicles frequently proceeding from the knots; near the summit pubescent, green, and furnished with leaves seldom exceeding six in number. These are opposite, petiolate, oblong obovate, acute, entire, from three to four inches long, from one to two broad, obscurely green and somewhat rough on their upper surface, pale, downy, and veined on the under. At the base of each pair of leaves are deciduous stipules, embracing the stem, membranous at their base, and separated above into numerous bristle-like divisions. The flowers are very small, white, and collected to the number of eight, twelve, or more, each accompanied with a green bracte, into a semi-globular head, supported upon a round, solitary, axillary footstalk, and embraced by a monophyllous involucre deeply divided into four, sometimes five or six obovate, pointed segments. The fruit is an ovate, obtuse berry, which is at first purple, but becomes almost black when ripe, and contains two small plano-convex seeds.

The plant is a native of Brazil, flourishing in moist, thick, and shady woods, and abounding most within the limits of the eighth and twentieth degrees of south latitude. It flowers in January and February, and ripens its fruit in May. The root is usually collected during the period of flowering, though equally good at other seasons. By this practice the plant is speedily extirpated in places where it is most eagerly sought. Were the seeds allowed to ripen, it would propagate itself rapidly, and thus maintain a constant supply. The root is collected chiefly by the Indians, who prepare it by separating it from the stem, cleaning it, and hanging it up in bundles to dry in the sun. The Brazilian merchants carry on a very brisk trade in this drug. The chief places of export are Rio Janeiro, Bahia, and Pernambuco. It is brought to the United States in large bags or bales.

Genuine ipecacuanha is in pieces two or three lines in thickness, variously bent and contorted, simple or branched, consisting of an interior slender, light straw-coloured, ligneous chord, with a thick cortical covering, which presents on its surface a succession of circular, unequal, prominent rings or rugæ, separated by very narrow fissures frequently extending nearly down to the central fibre. This appearance of the surface has given rise to the term *annelé* or *annular*, by which the true ipecacuanha is designated in the French works on pharmacy. The cortical part is hard, horny, and semi-transparent, breaks with a resinous fracture, and easily separates from the tougher ligneous fibre, which possesses the medicinal virtues of the root in a much inferior degree. Attached to the root is frequently a smoother and more slender portion, which is the base of the stem, and should be separated before pulverization. Much stress has been laid in works on the materia medica upon the colour of the external surface of the ipecacuanha root, and diversity in this respect has even led to the formation of distinct varieties. Thus the epidermis is sometimes deep brown or even blackish, sometimes reddish-brown or reddish-gray, and sometimes light gray or ash-coloured. Hence the distinction into *brown*, *red*, and *gray ipecacuanha.* But these are all derived from the same plant, are essentially the same in properties and composition, and probably differ only in consequence of difference in age, or place of growth, or mode of desiccation. The colours in fact are often so intermingled, that it would be impossible to decide in which variety a particular specimen should be placed. The *brown* is the most abundant in the packages which reach our market. The *red*, besides the colour of its epidermis, presents a rosy tint when broken, and is said to be somewhat more bitter than the preceding variety. The *gray* is much lighter coloured externally, usually rather larger, with less prominent rings and wider fissures, and is still more decidedly bitter. When the bark in either variety is opaque, with a dull amylaceous aspect, the root is less active as a medicine. As the woody part is nearly inert, and much more difficult of pulverization than the cortical, it often happens that when a particular parcel of the root is powdered, the portion which remains last in the mortar possesses scarcely any emetic power; and care should be taken to provide against any defect from this cause. The colour of the powder is a light grayish fawn.

Ipecacuanha has little smell in the aggregate state, but when powdered has a peculiar nauseous odour, which in some persons excites violent sneezing, in others dyspnœa resembling an attack of asthma. The taste is bitter, acrid, and very nauseous. Water and alcohol extract its virtues, which are injured by decoction. Its emetic property resides in a peculiar alkaline principle called *emetin*, or more properly *emetia*, discovered by Pelletier in the year 1817. The cortical portion of the brown ipecacuanha, analyzed by this chemist under the erroneous name of *Psychotria emetica*, yielded in the hundred parts, 16 of an impure salt of emetia, which was at first considered the pure emetic principle, 2 of an odorous fatty matter, 6 of wax, 10 of gum, 42 of starch, 20 of lignin, with 4 parts loss. The woody fibre was found to contain only 1.15 per cent. of the impure emetia. M. A. Richard obtained from the cortical part, the same proportion of emetia as found by Pelletier, but detected some principles not noticed by that chemist, among which were traces of gallic acid. The bark of the red ipecacuanha was found by Pelletier to contain but fourteen per cent. of the impure emetia. The *gray* variety has not been analyzed. One hundred parts of good ipecacuanha contain about 80 of cortical and 20 of ligneous matter.

Emetia when perfectly pure is whitish, inodorous, slightly bitter, pulverulent, unalterable in the air, very fusible, sparingly soluble in cold water and ether, very soluble in alcohol, is not reddened by nitric acid, forms crystallizable salts with the mineral acids and acetic acid, is precipitated by gallic acid from its solutions, and contains nitrogen among its ingredients. It is, however, very difficult to procure it in this state of purity, and the proportion afforded by the root is exceedingly small. As originally obtained it was very impure, probably in the condition of a salt, and in this state is directed by the French Codex. *Impure emetia* is in transparent scales of a brownish-red colour, almost inodorous, of a bitterish acrid state, deliquescent, very soluble in water and alcohol, insoluble in ether, precipitated from its solutions by gallic acid and the acetates of lead, but not by tartar emetic or the salts of iron. It is obtained by treating powdered ipecacuanha with ether to remove the fatty matter, exhausting the residue with alcohol, evaporating the alcoholic solution to dryness, and subjecting the extract to the action of cold water, which dissolves the emetia with some free acid, and leaves the wax and other matters. To separate the acid, the watery solution is treated with carbonate of magnesia, filtered, and then evaporated. If pure *emetia* is required, magnesia is used instead of the carbonate. The salt is thus decomposed, and the organic alkali being insoluble is precipitated with the excess of the earth. The precipitate is washed with cold water, and digested in alcohol, which dissolves the *emetia;* the alcoholic solution is then evaporated, the residue redissolved in a dilute acid, and the alkali again precipitated by a salifiable base. To deprive it of colour it is necessary to employ animal charcoal. Berzelius has obtained emetia by treating the powdered root with very dilute sulphuric acid, precipitating with magnesia, and treating the precipitate in the manner above directed. Pure emetia has at least three times the strength of the impure.

Medical Properties and Uses. Ipecacuanha is in large doses emetic, in smaller, diaphoretic and expectorant, and in still smaller, stimulant to the stomach, exciting appetite and facilitating digestion. In quantities insufficient to vomit, it produces nausea and frequently acts upon the bowels. As an emetic it is mild but tolerably certain in its operation, and being usually thrown from the stomach by one or two efforts, is less apt to produce dangerous effects when taken in an overdose than some other substances of the same class. It is also recommended by the absence of corrosive and narcotic properties.

It was employed as an emetic by the natives of Brazil, when that country was first settled by the Portuguese; but, though described in the work of Pison, it was not known in Europe till the year 1672, and did not come into use till some years afterwards. John Helvetius, grandfather of the celebrated author of that name, having been associated with a merchant who had imported a large quantity of ipecacuanha into Paris, employed it as a secret remedy, and with so much success in dysentery and other bowel affections, that general attention was attracted to it; and the fortunate physician received from Louis XIV. a large sum of money, and public honours, on the sole condition that he should make the remedy public. From this period it has maintained its standing among the most useful articles of the materia medica.

As an emetic it is peculiarly adapted by its mildness and efficiency to all cases in which the object is merely to evacuate the stomach, or a gentle impression only is desired; and in most other cases in which emetics are indicated, it may be advantageously combined with the more energetic medicines, the action of which it renders safer by insuring their discharge. It is especially useful where narcotic poisons have been swallowed, as under these circumstances it may be given in almost indefinite doses, with little comparative risk of injury to the patient. In dysentery it has been supposed to exercise peculiar powers; but is at present less used than formerly in doses sufficient to excite vomiting. As a nauseating remedy it is used in asthma, hooping cough, and the hemorrhages; as a diaphoretic, combined with opium, in a wide circle of diseases. (See *Pulvis Ipecacuanhæ et Opii.*) Its expectorant properties render it beneficial in catarrhal and other pulmonary affections. It has been given also, with supposed advantage, in very minute doses, in dyspeptic cases, and in chronic disease of the gastro-intestinal mucous membrane.

Ipecacuanha is most conveniently administered as an emetic in the form of powder suspended in water. The dose is about twenty grains, repeated if necessary at intervals of twenty minutes till it operates. Its operation may be facilitated and rendered milder by copious draughts of warm water or warm chamomile tea. An infusion in boiling water in the proportion of two drachms of the powder to six fluidounces of menstruum, may be given in the dose of a fluidounce repeated as in the former case. With a view to the production of nausea, the dose in substance may be two grains, given more or less frequently according to circumstances. As a diaphoretic it may be given in the quantity of a grain; as an alterative, in diseases of the stomach and bowels, of a quarter or half a grain two or three times a day.

Emetia has been used on the continent of Europe as a substitute, but with no great advantage. Its operation on the stomach is apt to be more violent and continued than that of ipecacuanha itself; and if given in overdoses, it may produce dangerous and even fatal consequences. From the experiments of Magendie, it appears to have a peculiar direction to the mucous membranes of the alimentary canal and the bronchial tubes. Ten grains of the impure alkali administered to dogs, were generally found to destroy life in twenty-four hours, and the mucous membranes mentioned were observed to be inflamed throughout their whole extent. The same result took place when emetia was injected into the veins, or absorbed from any part of the body. The dose of impure emetia is about a grain and a half, of the pure not more than half a grain, repeated at proper intervals till it vomits. In proportional doses it may be applied to the other purposes for which ipecacuanha is used. It will excite vomiting when applied to a blistered surface after the removal of the cuticle. Magendie found that dogs slept much after being vomited with emetia, and concluded that the medicine was narcotic; but other emetic medicines produce the same effect, which is to be ascribed rather to exhaustion than to any direct operation on the brain.

Off. Prep. Pulvis Ipecacuanhæ et Opii, *U. S.*, *Lond.*, *Ed.*, *Dub.*; Vinum Ipecacuanhæ, *U.S.*, *Lond.*, *Ed.*, *Dub.*

IPECACUANHAS NOT OFFICINAL.

When ipecacuanha began to be popular in Europe, the roots of several other plants were imported and confounded with the genuine, and the name came at length to be applied to almost all emetic roots derived from the American continent. Several of these are still occasionally found in commerce, and retain the name originally applied to them. The two most worthy of notice are the ipecacuanha of New Granada and Peru, and the white ipecacuanha of Brazil. On each of these we shall offer a few remarks.

1. *Peruvian Ipecacuanha.*—This is the root of the *Psychotria emetica*, formerly supposed to produce the genuine Brazilian ipecacuanha. The plant, like the Cephaëlis, belongs to the class and order Pentandria Monogynia, and to the natural order Rubiaceæ of Jussieu. A description of it sent by Mutis was published by Linnæus the younger in his supplement. It has since been described in the *Plant. Æquinox.*; and has been figured by A. Richard in his History of the Ipecacuanhas, and by Hayne in the eighth volume of his Medical Botany published at Berlin. It is a small shrub, with a stem twelve or eighteen inches high, simple, erect, round, slightly pubescent, and furnished with opposite, oblong lanceolate, pointed leaves, narrowed at their base into a short petiole, and accompanied with pointed stipules. The flowers are small, white, and supported in small clusters towards the end of an axillary peduncle. The plant flourishes in Peru and New Granada, and was seen by Humboldt and Bonpland growing in abundance near the river Magdalena. The dried root is exported from Carthagena.

It is cylindrical, somewhat thicker than the root of the Cephaëlis, usually simple, but sometimes branched, not much contorted, wrinkled longitudinally, presenting here and there deep circular intersections, but without the annular rugæ of the true ipecacuanha. The longitudinal direction of the wrinkles has given origin to the name of *striated ipecacuanha*, by which it is known in French Pharmacy. It consists of an internal woody chord and an external cortical portion; but the former is usually larger in proportion to the latter than in the root of the Cephaëlis. The bark is soft and easily cut with a knife, and when broken exhibits a brown slightly resinous fracture. The epidermis is of a dull reddish-gray colour, which darkens with age and exposure, and ultimately becomes almost black. Hence the root has sometimes been called *black ipecacuanha*. The ligneous portion is yellowish, and perforated with numerous small holes visible by the microscope. The Peruvian ipecacuanha is nearly inodorous, and has a flat taste, neither bitter nor acrid. Out of 100 parts Pelletier obtained 9 of impure emetia, 12 of fatty matter, with an abundance of starch, besides gum and lignin. The dose, as an emetic, is from two scruples to a drachm.

2. *White Ipecacuanha.*—This variety was noticed in the work of Pison, but the vegetable which produced it was not satisfactorily ascertained till a recent date. Gomez, indeed, in the memoir which he published at Lisbon, A.D. 1801, gave a figure and description of the plant; but the memoir was not generally known, and botanists remained uncertain upon the subject. By the travels of M. Saint-Hilaire and Dr. Martius in Brazil, more precise information has been obtained; and the white ipecacuanha is now confidently referred to different species of *Richardsonia*, the *Richardia* of Linnæus. The *R. scabra*, or *R. Braziliensis* of Gomez, and the *R. emetica* are particularly indicated by Martius, who also states that different species of *Ionidium* (Ventinat), *Viola* (Linn.), produce what is called *white ipecacuanha*. The name of *undulated ipecacuanha* is proposed by Guibourt for this variety, from the peculiar character of the surface, which presents indentations or concavities on one side, corresponding with prominences or convexities on the other, so as to give a wavy appearance to the root. It differs little in size from the genuine; is of a whitish-gray colour externally; and when broken presents a dull white farinaceous fracture, offering by the light of the sun, shining points, which are nothing more than small grains of fecula. Like the other varieties it has a woody centre. It is inodorous and insipid, and contains, according to Pelletier, a very large proportion of starch, with only six per cent. of impure emetia, and two of fatty matter. Richard found only 3.5 parts of emetia in the hundred. It is said to be sometimes mixed with the genuine ipecacuanha; but we have discovered none in the bales which we have examined.* W.

IRIS FLORENTINA. *U.S.*

Florentine Orris.

"Iris Florentina. Radix. *The root.*" *U.S.*

Off. Syn. IRIDIS FLORENTINÆ RADIX. *Ed.*

Iris de Florence, *Fr.;* Florentinische Violenwurzel, *Germ.;* Ireos, *Ital.;* Lirio Florentina, *Span.*

IRIS. *Sex. Syst.* Triandria Monogynia.—*Nat. Ord.* Irideæ.

Gen. Ch. *Corolla* six-parted; the alternate segment reflected. *Stigmas* petal-shaped. *Willd.*

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* See a paper on Ipecacuanha by R. E. Griffith, M. D., in the Journ. of the Phil. Col. of Pharm. Vol. 3. p. 181, for a more extended account of the roots which have been used under the name of Ipecacuanha.

In all the species belonging to this genus, so far as examined, the roots are more or less acrid, and possessed of cathartic and emetic properties. In Europe, the *I. fœtidissima*, *I. Florentina*, *I. Germanica*, *I. pseudo-acorus*, and *I. tuberosa* have at various times been admitted into use. Of these the *I. Florentina* is the only one acknowledged by the British or American Pharmacopœias.

Iris Florentina. Willd. *Sp. Plant.* i. 226; Woodv. *Med. Bot.* p. 776. t. 262. The root of the Florentine Iris is perennial, horizontal, tuberous, fleshy, fibrous, and covered with a brown epidermis. The leaves spring directly from the root, are sword-shaped, pointed, nerved, and shorter than the stem, which rises from the midst of them more than a foot in height, round, smooth, jointed, and bearing commonly two large white or bluish-white terminal flowers. The calyx is a spathe with two valves. The corolla divides into six segments or petals, of which three stand erect, and the remaining three are bent backward, and bearded within at their base with yellow-tipped white hairs. The fruit is a three-celled capsule, containing numerous seeds.

This plant is a native of Italy, and other parts of the South of Europe. The root, which is the officinal portion, is dug up in spring, and prepared for the market by the removal of its cuticle and fibres. It is brought from Leghorn in large casks.

Properties. The Florentine orris is in pieces of various form and size, often branched, usually about as thick as the thumb, knotty, flattened, white, heavy, of a rough though not fibrous fracture, a pleasant odour resembling that of the violet, and a bitterish acrid taste. The acrimony is greater in the recent than in the dried root; but the peculiar smell is more decidedly developed in the latter. The pieces are brittle and easily powdered, and the powder is of a dirty white colour. Vogel obtained from Florentine orris, gum, a brown extractive, fecula, a bitter and acrid fixed oil or soft resin, a volatile crystallizable oil, and vegetable fibre.

Medical Properties. This medicine is cathartic, and in large doses emetic, and was formerly employed to a considerable extent on the continent of Europe. It is said also to be diuretic, and to have proved useful in dropsies. At present it is chiefly valued for its pleasant odour. It is occasionally chewed to conceal an offensive breath, and enters into the composition of numerous tooth-powders. It is one of the ingredients of the *Emplastrum Plumbi Carbonatis* of the United States Pharmacopœia. In the form of small round balls, about the size of a pea, it is much used by the French for maintaining the discharge from issues, a purpose to which it is adapted not only by its odour, but also by the slight degree of acrimony which it retains in its dried state, and by the property of swelling very much by the absorption of moisture.

W.

Off. Prep. Emplastrum Plumbi Carbonatis, *U.S.*

IRIS VERSICOLOR. *U.S. Secondary.*

Blue Flag.

"Iris versicolor. Radix. *The root.*" *U.S.*

IRIS. See IRIS FLORENTINA.

Iris versicolor. Willd. *Sp. Plant.* i. 233; Bigelow, *Am. Med. Bot.* i. 155. This indigenous species of Iris has a perennial, fleshy, horizontal, fibrous root, and a stem two or three feet high, round on one side, acute on the other, and frequently branching. The leaves are sheathing at the base, sword-shaped, and striated. The flowers are from two to six in number, and are usually blue or purple, though varying much in colour. The capsule has three valves, is divided into three cells, and when mature is oblong, three-sided, with obtuse angles, and contains numerous flat seeds.

The blue flag is found in all parts of the United States, flourishing in low wet places, in meadows, and on the borders of swamps, which it serves to adorn with its large and beautiful flowers. These make their appearance in June. The root is the medicinal portion. The flowers afford a fine blue infusion, which serves as a test of acids and alkalies.

The recent root is without odour, and has a nauseous, extremely acrid taste, which is imparted to water by decoction, and still more perfectly to alcohol. The acrimony as well as medicinal activity is impaired by age.

The blue flag possesses the cathartic, emetic, and diuretic properties common to most of the species of this genns. It is said by Mr. Bartram to be held in much esteem by the Southern Indians; and Dr. Bigelow informs us that he has found it efficacious as a purgative, though inconvenient from the distressing nausea and prostration which it is apt to occasion. Dr. Macbride of Carolina found it useful in dropsy. It is, however, very little employed by the profession at large, and is seldom if ever kept in the shops. It may be given in substance, decoction, or tincture. The dose of the dried root is from ten to twenty grains. W.

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JALAPA. *U.S.*

Jalap.

"Ipomœa Jalapa, *Coxe;* Convolvulus Jalapa, *Willdenow.* Radix. *The root.*" *U. S.*

Off. Syn. JALAPÆ RADIX. Convolvulus Jalapa. Radix. *Lond.;* CONVOLVULI JALAPÆ RADIX. *Ed.;* JALAPA. CONVOLVULUS JALAPA. Radix. *Dub.*

Jalap, *Fr.;* Jalappen-Wurzel, *Germ.;* Sciarappa, *Ital.;* Jalapa, *Span.*

The precise botanical character of the jalap plant has long been a matter of much uncertainty. Linnæus, following Clusius, Plumier, Tournefort, and others, at first referred it to the *Mirabilis*, but subsequently adopting the opinion of Ray and Miller, was led to consider it a *Convolvulus*, and named it accordingly *C. Jalapa*, a title by which it has since been generally described in botanical and medical works. Thierry de Menonville, who in 1777 was in that part of Mexico where the plant flourishes, soon afterwards described a vegetable which he found in the neighbourhood of the city of Vera Cruz, and which he supposed to be identical with that which yields jalap. His description was found to correspond exactly with the character of a plant which Michaux the elder had sent from Charleston, South Carolina, to the Botanical Garden at Paris, and which he had described under the name of *Ipomœa macrorhiza.* This was figured by Desfontaines, and thought by many to be the true jalap plant; and as the *I. macrorhiza* grows in Georgia and Florida, it was inferred that this valuable drug was produced within the limits of the United States. Pursh was so convinced of the identity of the jalap of Mexico with the *I. macrorhiza* of Michaux, that he conferred upon the latter the title of *Ipomœa Jalapa.* But there are several circumstances which tend to prove that the two plants have been improperly confounded. The simple fact that the *I. macrorhiza* has a root which weighs from fifty to sixty pounds, is sufficient to prove that it cannot be the source of the officinal jalap, of which the dried tubers as they reach us are very seldom larger than the fist, and the slices could by no possibility be derived from a root of very great magnitude. Besides, the root of the *I. macrorhiza* was ascertained by Dr. Baldwin to possess little or no purgative power; and another striking dissimilarity between this plant and the true jalap, is that the leaves of the former are downy on their under surface, while there is every reason to believe that those of the latter are perfectly smooth; for a plant raised by Miller from seeds sent from Mexico by Dr. Houston, who was well acquainted with the true jalap, is described in the sixth edition of the Gardener's Dictionary as having smooth leaves; and the same fact is stated of the plant by M. Ledanois in a recent communication transmitted from Mexico to Paris. Thierry de Menonville was, therefore, in all probability mistaken in considering as the jalap plant, that found by him in the vicinity of Vera Cruz; and his mistake has been the source of numerous errors in subsequent writers. It is thought by some that his plant, and consequently the *I. macrorhiza*, is the source of the *mechoacan*, a purgative root also brought from Mexico, and sometimes mixed with the jalap; but the fact has not been well ascertained. The question now recurs, what is the jalap plant? Is it a Convolvulus as generally supposed, or is it an Ipomœa? These two genera are closely allied, the most striking difference being in the character of the *stigma*, which in the Convolvulus is double, in the Ipomœa, according to Elliott, simple and capitate. Some botanists place in the latter genus those Convolvuli which have divided but capitate stigmas, retaining in the former those only in which this organ is filiform. Nuttall, however, follows Elliott, and on this side of the Atlantic, the authority of these two botanists may be considered as decisive. According to this arrangement the plant of Michaux is a *Convolvulus*. There is good reason to believe that the jalap plant is an *Ipomœa*. That figured and described by Woodville under the name of *Convolvulus Jalapa*, the description of which was copied by Dr. Thomson in his Dispensatory, was introduced into the royal garden at Kew, in 1778, by M. Thouin; but we have no evidence that it is the true jalap, and Nuttall thinks it resembles more closely the *Convolvulus panduratus*. In the year 1827, Dr. John R. Coxe, Professor of Materia Medica in the University of Pennsylvania, received directly from Xalappa several small jalap plants in a growing state; and having placed them in his garden, succeeded in raising one with all the parts necessary for a decision upon its botanical character. Mr. Nuttall, to whom it was exhibited, had no hesitation in pronouncing it an Ipomœa, and described it with the title of Ipomœa Jalapa. This title is recognised in the United States Pharmacopœia. The British Colleges still refer the drug to the Convolvulus Jalapa.

IPOMŒA. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Convolvulaceæ.

Gen. Ch. *Calyx* five-cleft. *Corolla* funnel-form or campanulate, five-plaited. *Stigma* capitate, globose. *Capsule* two or three-celled, many-seeded. *Nuttall.*

Ipomæa Jalapa. Nuttall, *Am. Journ. Med. Sciences*, v. 300. The root of this plant is a roundish somewhat pearshaped tuber, externally blackish, internally white, with long fibres proceeding from its lower part as well as from the upper root-stalks. A tuber raised by Dr. Coxe was in its third year between two and three inches in diameter. The stem is round, smooth, much disposed to twist, and rises to a considerable height upon neighbouring objects, about which it twines. The leaves are heart-shaped, entire, smooth, pointed, deeply sinuated at the base, prominently veined on their under surface, and supported upon long footstalks. The lower leaves are nearly hastate, or with diverging angular points. The flowers, which are large and of a lilac-purple colour, stand upon peduncles about as long as the petioles. Each peduncle supports two, or more rarely three flowers. The calyx is without bractes, five-leaved, obtuse, with two of the divisions external. The corolla is funnel-form. The stamens are five in number, with oblong, white, somewhat exserted anthers. The stigma is simple and capitate. The above description is taken from that drawn up by Mr. Nuttall, and published in Dr. Coxe's paper in the American Journal of the Medical Sciences.

The jalap plant is a native of Mexico, and derived its name from the city of Xalappa, in the state of Vera Cruz. It might undoubtedly be cultivated in the southern section of the United Sates; as the offset of the root planted by Mr. Nuttall so far north as Cambridge, Massachusetts, survived the winter, and produced in the following season a vigorous plant. Jalap is brought from the port of Vera Cruz in bags containing usually between one hundred and two hundred pounds.

Properties. The tuber comes either whole, or divided longitudinally into two parts, or in transverse circular slices. The entire tubers are irregularly roundish, or ovate and pointed, or pear-shaped, usually much smaller than the fist, and marked with circular or vertical incisions, made to facilitate their drying. In this state, the root is preferred, as it is less apt to be defective, and is more easily distinguished from the adulterations than when sliced. A much larger proportion comes in this shape than formerly, indicating a greater scarcity of the older roots, which it is necessary to slice in order to dry them properly. The tuber is heavy, compact, hard, brittle, with a shining undulated fracture, exhibiting numerous resinous points, distinctly visible by the microscope. It is externally brown and wrinkled, internally of a grayish colour, diversified by concentric darker circles, in which the matter is denser and harder than in the intervening spaces. It is always kept in the shops in the state of powder, which is of a yellowish-gray colour, and when inhaled irritates the nostrils and throat, and provokes sneezing and coughing. The odour of the root, when cut or broken, is heavy, sweetish, and rather nauseous; the taste is sweetish, somewhat acrid, and disagreeable. It yields its active properties partly to water, partly to alcohol, and completely to diluted alcohol. M. Cadet de Gassicourt obtained from 500 parts of jalap, 24 of water, 50 of resin, 220 of gummy extract, 12.5 of fecula, 12.5 of albumen, 145 of lignin, 16.3 of saline matters, 2.7 of silica, with a loss of 17 parts. The *jalapin* of Mr. Hume has proved to consist of inorganic salts. The resin of jalap consists of two portions, one of which, amounting to seven parts out of ten, is hard and insoluble in ether, the other is soft and soluble in that menstruum. The proportion of resin to the other ingredients of the root varies considerably in different specimens. According to Gerber, the root contains 7.8 per cent. of hard resin, 3.2 of soft resin, 17.9 of extractive, 14.5 of gummy extract, 8.2 of a colouring substance which becomes red under the influence of the alkaline carbonates, 1.9 of uncrystallizable sugar, 15.6 of gum mixed with some saline matters, 3.2 of bassorin, 3.9 of albumen, 6.0 of starch, 8.2 of lignin, with some water, and various salts.

Jalap is apt to be attacked by worms, which, however, are said to devour the amylaceous or softer parts, and to leave the resin; so that the worm-eaten drug is more powerfully purgative than that which is sound. Thus out of 397 parts of the former M. Henry obtained 72 parts of resin, while from an equal quantity of the latter he procured only 48 parts. Hence worm-eaten jalap should be employed for obtaining the resin, but should not be pulverized, as it would afford a powder of more than the proper strength.

Adulterations. Jalap is said to be sometimes adulterated with *bryony root;* but no instance of the kind has come under our notice; and the two drugs are so widely different that the fraud would be instantly detected. This must be at once evident from the following description of bryony root, which we copy from Fée's work on the Natural History of Drugs. "Root spindle-shaped, about a foot long and nearly six inches in diameter, usually branching, obtuse, rounded at the top, of a yellowish-white colour, rough, with close transverse wrinkles, and a white, fleshy, succulent parenchyma."* It is probable, however, that the adulteration which has been considered as bryony root, is the *mechoacan*, which in Europe, is sometimes called American bryony, and was formerly erroneously supposed to be derived from a species of Bryonia. The *mechoacan* is a product of Mexico, which was taken to Europe even before the introduction of jalap. We have before stated that the plant which produces it is probably identical with the *Ipomœa macrorhiza* of Michaux, the *Convolvulus macrorhizus* of some other authors. According to M. Fée, it is in "fragments of various forms, or in whitish slices, which are fibrous, softish, invested with a grayish and rough bark, solid, white, or yellowish-white internally." This description answers very closely to the characters of a drug known in our markets as spurious jalap, which often comes mingled with the genuine, and has sometimes been imported unmixed in mistake for that root. Whether it is really the mechoacan we are unable to decide with certainty, as it is not known by that name to our merchants. It always comes in slices, which are evidently portions of a large, and probably a spindle-shaped root. The shape of the greater number of pieces indicates that the root was sliced transversely, and each circular slice divided into quarters. The horizontal cut surface is dark from exposure, unequal from the greater shrinking in the drying process of some parts than others, and presents the extremities of numerous fibres, which are often concentrically arranged, and run in the longitudinal direction of the root. Internally the colour is whitish, and the texture, though much less compact than that of jalap, is sometimes almost ligneous. The taste, like that of mechoacan, is at first insensible, but after some time becomes somewhat acrid and nauseous. The mechoacan is truly an adulteration, as its purgative powers are very feeble.

Mixed with jalap are also sometimes found transverse circular slices about the size of those of columbo root, with a uniform, white, amylaceous parenchyma, between which and the bark is a very evident line of division. Whether these are derived from the same or a different plant we are unable to decide. They are evidently destitute, or nearly so, of the resinous constituent of jalap, and should be rejected.

It is not impossible that portions of the root of a plant called in Mexico *male jalap*, may sometimes be mixed with the genuine drug. According to M. Ledanois this root is spindle-shaped, and sometimes twenty inches long.

Jalap should be rejected when it is light, of a whitish colour internally, of a dull fracture, spongy, or friable.

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* The plant producing this root is the *Bryonia alba*, figured and described in Woodville's Med. Bot. page 194. The root was formerly among the medicines directed by the Edinburgh College. As prepared for the shops, it was usually in transverse slices. It is a powerful, irritating, hydragogue cathartic, said to be diuretic in small doses; but has been abandoned in consequence of its uncertainty and occasional harshness.

Medical Properties and Uses. Jalap is an active cathartic, operating briskly and sometimes painfully upon the bowels, and producing copious watery stools. The aqueous extract purges moderately, without much griping, and is said to increase the flow of urine. The portion not taken up by water gripes severely. The watery extract obtained from jalap previously exhausted by rectified alcohol, is said to have no cathartic effect, but to operate powerfully by urine. (*Duncan.*) The alcoholic extract, usually called resin of jalap, purges actively and often produces severe griping. From these facts it appears, that the virtues of this cathartic do not depend exclusively upon any one principle. Jalap was introduced into Europe in the latter part of the sixteenth, or beginning of the seventeenth century, and now ranks among the purgative medicines most extensively employed. It is applicable to most cases in which an active cathartic is required, and from its hydragogue powers is especially adapted to the treatment of dropsy. It is generally given in connexion with other medicines which assist or qualify its operation. In dropsical complaints it is usually combined with the supertartrate of potassa; and the same mixture is much employed in the treatment of the hip disease, and scrofulous affections of other joints. With calomel its forms a cathartic compound, which has long been highly popular in the United States in bilious fever, and other complaints attended with congestion of the liver or portal circle.

The dose of jalap in powder is from fifteen to thirty grains; of the resin or alcoholic extract, which is much used on the continent of Europe, from four to eight grains. The latter is usually given rubbed up with sugar, or in emulsion, by which its tendency to irritate painfully the mucous membrane of the bowels is thought to be in some measure obviated. The extract of the United States and British Pharmacopœias is preferable to the alcoholic, as it more completely represents the jalap itself. The dose of calomel and jalap is ten grains of each, that of the supertartrate of potassa and jalap, two drachms of the former and ten or fifteen grains of the latter.

Off. Prep. Extractum Jalapæ, *U.S.*, *Lond.*, *Ed.*, *Dub.*; Pulvis Jalapæ Compositus, *Ed.*, *Dub.*; Tinctura Jalapæ, *U.S.*, *Lond.*, *Ed.*, *Dub.*; Tinctura Sennæ et Jalapæ, *U.S.*, *Ed.* W.

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JUGLANS. *U.S.*

Butternut.

"Juglans cinerea. Radicis liber. *The inner bark of the root.*" *U.S.*

JUGLANS. *Sex. Syst.* Monœcia Polyandria.—*Nat. Ord.* Terebintaceæ, *Juss.*; Juglandeæ, *De Cand.*, *Lindley.*

Gen. Ch. MALE. *Amentum* imbricated. *Calyx* a scale. *Corolla* six-parted. *Filaments* four to eighteen. FEMALE. *Calyx* four-cleft, superior. *Corolla* four-cleft. *Styles* two. *Drupe* coriaceous, with a furrowed nut. *Willd.*

Juglans cinerea. Willd. *Sp. Plant.* iv. 456; Bigelow, *Am. Med. Bot.* ii. 115.—*J. Cathartica.* Michaux, *N. Am. Sylva.* i. 160. This is an indigenous forest tree, known in different sections of the country by the various names of *butternut*, *oilnut*, and *white walnut*. In favourable situations it attains a great size, rising sometimes fifty feet in height, with a trunk three or four feet in diameter at the distance of five feet from the ground. The stem divides, at a small distance from the ground, into numerous nearly horizontal branches, which spread widely, and form a large tufted head, giving to the tree a peculiar aspect. The young branches are smooth and of a grayish colour, which has given origin to the specific name of the plant. The leaves are very long, and consist of seven or eight pairs of sessile leaflets, and a single petiolate leaflet at the extremity. These are two or three inches in length, oblong-lanceolate, rounded at the base, acuminate, finely serrate, and somewhat downy. The male and female flowers are distinct upon the same tree. The former are in large aments, four or five inches long, hanging down from the sides of the shoots of the preceding year's growth near their extremity. The fertile flowers are at the end of the shoots of the same spring. The germ is surmounted by two large, feathery, rose-coloured stigmas. The fruit is sometimes single, suspended by a thin pliable peduncle; sometimes several are attached to the sides and extremity of the same peduncle. The drupe is oblong-oval, with a terminal projection, hairy, viscid, green in the immature state, but brown when ripe. It contains a hard, dark-coloured, oblong, pointed nut, with a rough deeply and irregularly furrowed surface. The kernel is thick, oily, and pleasant to the taste.

The butternut grows in Upper and Lower Canada, and throughout the whole northern, eastern, and western sections of the United States. In the Middle States, the flowers appear in May, and the fruit ripens in September. The tree, if pierced immediately before the leaves unfold, yields a richly saccharine juice, from which sugar may be obtained nearly if not quite equal to that from the sugar-maple. The wood, though neither strong nor compact, is useful for some purposes on account of its durability, and exemption from the attacks of worms. The fruit, when half grown, is sometimes made into pickles, and when ripe, affords, in its kernel, a grateful article of food. The bark is used for dyeing wool a dark brown colour, though inferior for this purpose to that of the black walnut. It is said, when applied to the skin, to have a rubefacient effect. The inner bark is the medicinal portion, and that of the root, being considered most efficient, is directed by the national Pharmacopœia. It should be collected in May or June.

On the living tree, the inner bark when first uncovered is of a pure white, which becomes immediately on exposure a beautiful lemon colour, and ultimately changes to deep brown. It has a fibrous texture, a feeble odour, and a peculiar, bitter, somewhat acrid taste. Its medical virtues are entirely extracted by boiling water. Dr. Bigelow could detect no resin among its constituents; and the presence of tannin was not evinced by the test of gelatin, though a brownish-black colour was produced by the sulphate of iron.

Medical Properties and Uses. Butternut is a mild cathartic, operating without pain or irritation, and resembling rhubarb in the property of evacuating without debilitating the alimentary canal. It was much employed during our revolutionary war by Dr. Rush and other physicians attached to the army, and was highly esteemed. It is especially applicable to cases of habitual costiveness and other bowel affections, particularly dysentery, in which it has acquired considerable reputation. In connexion with calomel it becomes more active, and is sometimes used in our intermittent and remittent fevers, and other complaints attended with congestion of the abdominal viscera. It is given in the form of decoction or extract, never in substance. The extract is officinal, and is almost always preferred. The dose is from twenty to thirty grains as a purge, from five to ten grains as a laxative.

Off. Prep. Extractum Juglandis, *U.S.* W.

JUNIPERUS. *U.S.*

Juniper.

"Juniperus communis. Baccæ. *The berries.*" *U.S.*

Off. Syn. JUNIPERI BACCÆ et CACUMINA. Juniperus communis. Baccæ et Cacumina. *Lond.;* JUNIPERI COMMUNIS BACCÆ. *Ed.;* JUNIPERUS COMMUNIS. Baccæ. Cacumina. *Dub.*

Genevrier commun, Baies de Genièvre, *Fr.;* Gemeiner Wachholder, Wachholderbeeren, *Germ.;* Ginepro, *Ital.;* Enebro, Bayas de enebro, *Span.*

Juniperus. *Sex. Syst.* Diœcia Monadelphia. *Nat. Ord.* Coniferæ.

Gen. Ch. Male. *Amentum* ovate. *Calyx* a scale. *Corolla* none. *Stamens* three. Female. *Calyx* three parted. *Petals* three. *Styles* three. *Berry* three seeded, irregular, with the three tubercles of the calyx. *Willd.*

Juniperus communis. Willd. *Sp. Plant.* iv. 853; Woodv. *Med. Bot.* p. 13. t. 6. This is an erect evergreen shrub, usually small, but sometimes attaining a height of twelve or fifteen feet, with numerous very close branches. The leaves are narrow, longer than the fruit, entire, sharply pointed, channeled, of a deep green colour, somewhat glaucous on their upper surface, spreading, and attached to the stem or branches in threes, in a verticillate manner. The flowers are diœcious and disposed in small, ovate, axillary, sessile, solitary aments. The fruit is a globular berry, formed of the fleshy coalescing scales of the ament, and containing three angular seeds.

The common juniper is a native of Europe; but has been introduced into this country, in some parts of which it has become naturalized. It is not uncommon in the neighbourhood of Philadelphia. The plant described in Bigelow's American Medical Botany under the title of *J. communis*, deserves, perhaps, to be considered a distinct species. It is a trailing shrub, seldom rising more than two or three feet in height, spreading in all directions, throwing out roots from its branches, and forming beds which are often many rods in circumference. The name of *J. depressa* has been proposed for it. The common juniper flowers in May; but does not ripen its fruit till late in the following year. All parts of the plant contain a volatile oil, which imparts to them a peculiar flavour. The wood has a slight aromatic odour, and was formerly used for fumigation. A terebinthinate juice exudes from the tree and hardens on the bark. This has been erroneously considered as identical with *sandarach*, which is in fact the product of the *Thuya articulata.* The fruit and tops of juniper are the only officinal parts.

The berries are sometimes collected in this country, and parcels are occasionally brought to the Philadelphia market from New Jersey. But, though equal to the European in appearance, they are inferior in strength, and are not much used. The best come from the South of Europe, particularly from Trieste and the Italian ports. They are globular; more or less shrivelled; about as large as a pea; marked with three furrows at the summit, and with tubercles from the persistent calyx at the base; covered with a glaucous bloom, beneath which they are of a shining blackish-purple colour; and containing a brownish-yellow pulp and three angular seeds. They have an agreeable somewhat aromatic odour, and a sweetish, warm, bitterish, slightly terebinthinate taste. These properties, as well as their medical virtues, they owe chiefly to an essential oil which may be separated by distillation. (See *Oleum Juniperi.*) The other ingredients, according to Trommsdorff, are resin, sugar, gum, wax, lignin, water, and various saline substances. The proportion of these ingredients varies according to the greater or less maturity of the berries. The volatile oil is most abundant in those which have attained their full growth and are still green, or in those which are on the point of ripening. In the latter, Trommsdorff found one per cent. of the oil. In those which are perfectly ripe it has been partly changed into resin, and in those quite black, completely so. The berries impart their virtues to water and alcohol. They are very largely consumed in the preparation of gin.

The tops of juniper are directed by the London and Dublin Colleges. Their odour is balsamic, their taste resinous and bitterish; and they possess similar virtues with the berries.

Medical Properties and Uses. Juniper berries are gently stimulant and diuretic, imparting to the urine the smell of violets; and producing occasionally, when very largely taken, disagreeable irritation in the urinary passages. They are chiefly used as an adjuvant to more powerful diuretics in dropsical complaints; but have been recommended also in scorbutic and cutaneous diseases, catarrh of the bladder, and atonic conditions of the alimentary canal and uterus. They may be given in substance triturated with sugar, in the dose of one or two drachms repeated three or four times a day. But the infusion is a more convenient form. It is prepared by macerating an ounce of the bruised berries in a pint of boiling water, the whole of which may be taken in the course of twenty-four hours. Extracts are prepared from the berries, both bruised and unbruised, and given in the dose of one or two drachms; but in consequence of the evaporation of the essential oil, they are probably not stronger than the berries in substance.

Off. Prep. Oleum Juniperi, *U.S., Lond., Ed. Dub.;* Spiritus Juniperi, Compositus, *U.S., Lond., Ed., Dub.* W.

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JUNIPERUS VIRGINIANA. *U.S. Secondary.*

Red Cedar.

"Juniperus Virginiana. Folia. *The leaves.*" *U.S.*

Juniperus. See JUNIPERUS.

Juniperus Virginiana. Willd. *Sp. Plant.* iv. 853; Bigelow, *Am. Med. Bot.* iii. 49; Michaux, *N. Am. Sylv.* iii. 221. This species of juniper, known commonly by the name of *red cedar*, is an evergreen tree of slow growth, seldom attaining a very large size, though sometimes rising forty or fifty feet in height, with a stem twelve or thirteen inches in diameter. It has numerous very close branches, which, in the young tree, spread out horizontally near the ground; but as the tree advances, the lower branches slowly decay, leaving the trunk irregular with knots and crevices. The leaves are very small, fleshy, ovate, concave, pointed, glandular on their outer surface, either ternate or in pairs, and closely imbricated. Those of the young shoots are often much longer, and spreading. The leaves closely invest the extreme twigs, increasing with their growth, till ultimately lost in the encroachments of the bark. "The barren flowers are in oblong aments, formed by peltate scales with the anthers concealed within them. The fertile flowers have a proper perianth, which coalesces with the germ, and forms a small, roundish berry, with two or three seeds, covered on its outer surface with a bright blue powder." (*Bigelow.*)

The red cedar grows in all latitudes of the United States, from that of Burlington in Vermont, to the Gulf of Mexico; but is most abundant and of most vigorous growth in the southern section, and within a short distance of the ocean. The interior wood is of a reddish colour, and highly valuable on account of its great durability. Small excrescencies which are sometimes found on the branches of the tree, are popularly used as an anthelmintic under the name of *cedar apples*. The leaves only are officinal.

They have a peculiar not unpleasant odour, and a strong, bitterish, somewhat pungent taste. These properties reside chiefly in an essential oil, and are readily imparted to alcohol. The tincture is rendered turbid by the addition of water; and the presence of tannin in the leaves is indicated by the usual tests.

The leaves of the *J. Virginiana* bear a close resemblance to those of the *J. Sabina*, from which they can be certainly distinguished only by the difference of odour.

Medical Properties and Uses. The resemblance of red cedar to savine is said also to extend to their medical properties; the former being considered, like the latter, stimulant, emmenagogue, diuretic, and, under certain circumstances, diaphoretic. It is, however, much less energetic; and though advantage may, as has been asserted, have accrued from its use in amenorrhœa, chronic rheumatism, and dropsy, it has not acquired the confidence of the profession generally. Externally applied it acts as an irritant; and an ointment prepared by boiling the fresh leaves for a short time in twice their weight of lard, with the addition of a little wax, is employed as a substitute for savine cerate in maintaining a purulent discharge from blistered surfaces. Sometimes the dried leaves in powder are mixed with six times their weight of resin cerate, and used for a similar purpose. But neither of these preparations is as effectual as the analogous preparations of savine. W.

KINO. *U.S., Lond., Ed., Dub.*

Kino.

"Nauclea gambir, et Pterocarpus erinacea. Extractum. *The extract.*" *U.S.*

Kino, *Fr., Germ., Ital.;* Quino, *Span.*

The term kino was originally applied to a vegetable extract or inspissated juice taken to London from the western coast of Africa, and introduced to the notice of the profession by Dr. Fothergill. Vegetable products obtained from various other parts of the world, resembling kino in their appearance and properties, have subsequently received the same name; and at present a confusion prevails in relation to the botanical and commercial history of the drug, which, in this country, cannot be satisfactorily settled. We shall present a view of the different varieties, as described in the works of highest authority on the materia medica.

1. *East India or Amboyna Kino.*—This is the kind which is said to be at present in most general use. It is thought to be the produce of the *Nauclea Gambir*, a twining East India shrub, belonging to the class and order *Pentandria Monogynia*, and the natural order *Rubiaceæ* of Jussieu; and described minutely by Mr. Hunter in the ninth volume of the London Linnean Transactions. This plant is a native of Malacca and the island of

Sumatra, where an extract is prepared from the young twigs and leaves, which is called *gutta gambeer* in the East, and is supposed by authors generally to be the same with kino. But any one who will compare Mr. Hunter's account of this extract with the characters of the kino of commerce, will be led at least to doubt their identity; and if the latter be procured from the same plant, it must be by a different process. The name of *Amboyna*, conferred on the East India kino, implies that it is prepared in that island also. It is this variety with which our market is chiefly supplied. We obtain it either directly from India, or more commonly from London, where it is bought at the East India Company's sales.

It is in small, angular, deep brown, shining, brittle fragments, of a uniform consistence, appearing as though formed by the breaking down of larger masses of a dried extract. These fragments are easily pulverized, affording a lighter brown somewhat reddish powder, a portion of which resulting from their mutual attrition, is usually found interspersed among them. They are without smell. The taste is very rough and astringent, and at first bitter; but ultimately leaves an impression of sweetness upon the tongue. Water at 60° dissolves two-thirds of this variety of kino, forming a deep brown clear solution. Alcohol also dissolves the greater portion, and the resulting tincture, which is of a deep claret colour, is not rendered turbid by the addition of water. The aqueous infusion affords a brick-red precipitate with a solution of isinglass, and an olive-black precipitate with the persulphate of iron. (*Thomson's Dispensatory.*)

2. *West India, or Jamaica Kino.* The source of this variety is not known with certainty. Dr. Duncan was informed by Dr. Wright that it was obtained from the *Coccoloba uvifera*, or seaside grape. The late Dr. Murray of Edinburgh was told, as we are informed in his work on Materia Medica, that it was the extract of the mahogany wood. Dr. Thomson states in his Dispensatory that none of it is now to be procured. Some years since a thick reddish-brown liquid was imported into Philadelphia from the West Indies, which, when dried by exposure to the air in shallow vessels, or by heat, afforded an extract having all the properties of kino, for which it was sold by our druggists. The supply, however, is now nearly or quite exhausted. We are unable to say what was its precise source, or whether it was identical with the variety described as Jamaica kino in the British pharmaceutical works.

The Jamaica kino, from whatever plant it may be derived, is evidently an extract. According to Dr. Duncan, it is in large fragments, sometimes retaining the impression of the vessel in which it was dried; of a homogeneous appearance; of a resinous fracture, exhibiting small air bubbles; of a dark brown almost black colour, but in very thin splinters transparent, and of a ruby redness; affording when pulverized a reddish brown powder; crackling under the teeth when chewed; of a taste somewhat acid at first, afterwards bitter and astringent, and ultimately sweetish. The greater part of it is soluble both in water and alcohol.

3. *African Kino.* The original kino employed by Dr. Fothergill was known to be the produce of a tree growing in Senegal and the neighbouring countries on the western coast of Africa; but the precise character of the tree was not ascertained, until a specimen sent home by Mungo Park, during his last journey, enabled the English botanists to decide that it was the *Pterocarpus erinacea* of Lamarck and Poiret. The London College accordingly refers kino to this plant; but in so doing have overlooked the fact, that the drug now used is seldom or never brought from Africa.

This variety of kino " is in very small, irregularly shaped, shining, deep ruby-brown coloured fragments, and intermixed with small twigs and minute bits of wood, which are whitish on the inside. It is pulverulent, affording a dark chocolate or reddish-brown powder. It is inodorous, and insipid when first taken into the mouth; but after some time it imparts a slight degree of roughness, with a scarcely perceptible sweetness, to the palate, feels gritty between the teeth when chewed, and does not colour the saliva." (*Thomson's Dispensatory.*) According to Dr. Thomson, water at 60° dissolves more than half of it, forming a brick-red, rather turbid infusion, which is not clear at the end of twenty-four hours. Alcohol dissolves nearly two-thirds, forming a very deep-brown coloured tincture, and leaving a nearly colourless residuum. The African kino is thought to be the concrete juice of the tree, and not an extract.

4. *Botany Bay Kino.* This is the concrete juice of the *Eucalyptus resinifera*, or brown gum tree of New Holland, a lofty tree, belonging to the class and order *Icosandria Monogynia*, and the natural order *Myrtaceæ*. When the bark is wounded the juice flows very freely, and hardens in the air. According to Mr. White, a single tree is capable of furnishing five hundred pounds of kino in one year. (*White's Voyage.*) Duncan states that specimens of the juice have reached Great Britain in the fluid state. The Edinburgh College erroneously adopts the inspissated juice of the *Eucalyptus resinifera* as the officinal kino. In relation to this variety Dr. Duncan states that when he first examined kino in 1802, it was common, and was the finest kind in commerce. According to information received by Dr. Thomson, its importation into Great Britain must have ceased soon after that period. (*Thomson's Dispensatory*, Edit. 1826, p. 506.) Ainslie informs us that he has met with it in the markets of Hindostan. Parcels may occasionally reach this country; but by such complicated routes that their origin is unknown.

Dr. Duncan thus describes it. "It occurs in dark brown masses of various sizes, either smooth or rounded on the surface, or in fragments often covered with a reddish-brown powder, fracture resinous and very unequal, appearance sometimes homogeneous but sometimes heterogeneous, mixed with bits of twigs, leaves, &c.; splinters transparent, ruby red; no smell, scarcely crackling under the teeth, but sometimes gritty from the accidental mixture of sand; taste simply astringent, succeeded by sweetness, and, when long chewed, a portion adheres to the teeth; infusible and friable; powder reddish-brown." White states that only one-sixth of this kino is soluble in water; Guibourt found it wholly soluble with the exception of foreign matters; and Dr. Thomson informs us that water at 60° dissolves more than one-half. These gentlemen must have experimented with different substances. According to Dr. Duncan, alcohol dissolves the whole except impurities, and the tincture, with a certain proportion of water, lets fall a copious red precipitate, but with a large portion only becomes slightly turbid.*

General Properties. Kino is in small, irregular, somewhat angular, shining fragments, of a dark brown or reddish-brown colour, brittle, pulverizable, and affording a powder which is lighter coloured than the masses. It is without odour, and has a bitterish, highly astringent, and ultimately sweetish taste. It is not softened by heat. Cold water dissolves it partially, boiling water more largely, and the saturated decoction becomes turbid on cooling, and deposites a reddish sediment. Alcohol dissolves the greater portion. It consists chiefly of a peculiar modification of tannin, with extractive matter, and, in some of the varieties, a minute proportion of resin. According to Vauquelin it contains no gallic acid. Its aqueous solution is precipitated by gelatin, by soluble salts of iron, silver, lead, and antimony, by the permuriate of mercury, and by the sulphuric, nitric, and muriatic acids. The alkalies favour its solubility in water, but essentially change its nature, and destroy its astringent property. Reference should be had to these relations of kino in prescribing it.

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* A drug has lately been brought into the market at Philadelphia, and sold in considerable quantities, under the name of kino, imported, as we are informed from Caraccas, but of unknown origin. It is in large masses of a very dark colour externally, of a deep reddish-brown internally, brittle, with an irregular but shining fracture, and readily breaking into small fragments, bearing some resemblance to those of the kino ordinarily found in the shops, but perhaps less angular. It is much mixed with impurities, but has a very astringent taste, and will probably be found to answer in practice the purposes of the medicine the name of which it has assumed. It is broken, for sale, by means of a mill, into small irregular pieces.

It is said that catechu, broken into small fragments, has sometimes been sold as kino. Fortunately little injury can result from the substitution, as the medical virtues of the two extracts are very nearly the same.

Medical Properties and Uses. Kino is powerfully astringent, and in this country is much used for the suppression of morbid discharges. In diarrhœa not attended with febrile excitement or inflammation, it is often an excellent adjunct to opium and the absorbent medicines, and is a favourite addition to the chalk mixture. It is also used in chronic dysentery when astringents are admissible; in leucorrhœa and diabetes; and in passive hemorrhages, particularly that from the uterus. It was formerly used in intermittent fever, but has given way to more efficient remedies.

It may be given in powder, infusion, or dissolved in diluted alcohol. The dose of the powder is from ten to thirty grains. The infusion, which is a very convenient form of administration, may be made by pouring eight fluidounces of boiling water on two drachms of the extract, and straining when cool. Aromatics may be added if deemed advisable. The dose is a fluidounce. The proportion of alcohol in a dose of the tincture, renders it frequently an unsuitable preparation.

Locally applied, kino is often productive of benefit. Its infusion is useful as an injection in leucorrhœa and obstinate gonorrhœa, and thrown up the nostrils we have found it very efficacious in suppressing hemorrhage from the Schneiderian membrane. A case of obstinate hemorrhage from a wound in the palate, after resisting various means, yielded to the application of powdered kino, which was spread thickly on lint, and pressed against the wound by the tongue. The powder is also a very useful application to indolent and flabby ulcers.

Off. Prep. Electuarium Catechu Compositum, *Ed.*, *Dub.*; Pulvis Kino Comp., *Lond.*, *Dub.*; Tinctura Kino, *Lond.*, *Ed.*, *Dub.* W.

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KRAMERIA. *U.S.*

Rhatany.

"Krameria triandra. Radix. *The root.*" *U.S.*

Off. Syn. KRAMERIÆ RADIX. Krameria triandra. Radix. *Lond.*; RHATANIA. KRAMERIA TRIANDRA. Radix et extractum. *Dub.*

Ratanhie, *Fr.*; Ratanhiawurzel, *Germ.*; Ratania, *Ital.*, *Span.*

KRAMERIA. *Sex. Syst.* Tetrandria Monogynia.—*Nat. Ord.* Polygaleæ.

Gen. Ch. *Calyx* none. *Corolla* four petalled; the superior nectary three-parted, and inferior two-leaved. *Berry* dry, echinated, one-seeded. *Willd.*

Krameria triandra. Ruiz and Pavon, *Flor. Peruv.* i. 61. The rhatany plant is a shrub having a long, much branched, and spreading root, of a blackish-red colour, with a round, procumbent, very dark coloured stem, divided into numerous branches, of which the younger are leafy and thickly covered with soft hairs, giving them a white, silky appearance. The leaves are few, sessile, oblong-ovate, pointed, entire, presenting on both surfaces the same silky whiteness with the young branches, on the sides of which they are placed. The flowers are lake-coloured, and stand singly on short peduncles at the axils of the upper leaves. There are only three stamens. The nectary consists of four leaflets, of which the two upper are spatulate, the lower roundish and much shorter: it does not correspond with the generic character of Willdenow, which was drawn from the *Krameria Ixina.* The fruit is globular, of the size of a pea, surrounded by stiff reddish-brown prickles, and furnished with one or two seeds.

This species of Krameria is a native of Peru, growing in dry argillaceous and sandy places, and abundant about the city of Huanuco. It flowers at all seasons, but is in the height of its bloom in October and November. The root is dug up after the rains.

The *K. Ixina*, growing in Hayti, and in Cumana on the South American continent, is said to afford a root closely analogous in appearance and properties to that of the Peruvian species; but the latter only is officinal.

The name *rhatany* is said to express, in the language of the Peruvian Indians, the creeping character of the plant.

We receive rhatany in pieces of various shapes and dimensions, some being simple, some more or less branched, the largest as much as an inch in thickness, being derived from the main body of the root, the smallest not thicker than a small quill, consisting of the minute ramifications. They are composed of a dark reddish-brown, slightly fibrous, easily separable bark, and a central woody portion less coloured, but still reddish, or reddish-yellow. The root is without smell, but has a bitter, very astringent, slightly sweetish taste, which is connected with its medical virtues, and is much stronger in the cortical, than the ligneous part. The smallest pieces are therefore preferable, as they contain the largest proportion of the bark. The powder is of a reddish colour. The virtues of the root are extracted by boiling water, which forms a dark brown infusion. By digestion in alcohol a deep reddish-brown tincture is obtained, from which a pink coloured precipitate separates upon the addition of water. From the researches of Vogel, Gmelin, Peschier, and Trommsdorff, the root appears to contain tannin, lignin, and minute quantities of gum, starch, saccharine matter, and an acid not well determined. The tannin is in three states; 1st. in that of purity, in which it is without colour, 2nd. that of apotheme, in which it has lost its astringency and been rendered insoluble by the action of the air, and 3rd. that of extractive, which is a soluble combination of tannin with its apotheme, and is the substance which imparts their characteristic reddish-brown colour to the infusion and tincture of rhatany. (Soubeiran, *Journ. de Pharm.* xix. 596.) The proportion of red astringent matter obtained by Vogel was 40 per cent. The mineral acids and most of the metallic salts throw down precipitates with the infusion, decoction, and tincture of rhatany, and are incompatible in prescription.

By evaporating the decoction an extract is obtained, which when dried has a reddish-brown colour, a vitreous and shining fracture, and yields a blood-red powder. It has the bitterness and astringency of the root, and bears a close resemblance to kino. But the extract of rhatany is better prepared with officinal alcohol than by decoction; as during the boiling process, a considerable quantity of the pure tannin is converted into insoluble and inert apotheme, and another portion unites with the starch to form a compound insoluble in cold water, and of no medical efficacy. An extract prepared from the cold infusion, though smaller in amount, is proportionably even richer in active matter than the alcoholic, as the latter necessarily contains the inert apotheme of the root, which, though insoluble in water, is dissolved by alcohol. The extract imported from South America is much inferior to that prepared in our shops.

Medical Properties and Uses. Rhatany is gently tonic and powerfully astringent; and may be advantageously given in chronic diarrhœa, passive hemorrhages, some forms of leucorrhœa, and in all those cases in which kino and catechu are beneficial. It has long been used in Peru as a remedy in bowel complaints, as a corroborant in cases of enfeebled stomach, and as a local application to spongy gums. Ruiz, one of the authors of the Peruvian Flora, first made it known in Europe. It has but recently been introduced into this country, where it is acquiring increased reputation. It has the advantage over the astringent extracts imported, that being brought in the state of the root, it is free from adulteration, and may be prescribed with confidence.

The dose of the powder is from twenty to thirty grains; but in this form the root is little used. The decoction is more convenient, and is usually preferred. It may be prepared by boiling an ounce of the bruised root in a pint of water, and taken in the dose of one or two fluidounces. The extract, when carefully made, is perhaps preferable to any other form, as it is of uniform strength. The dose is ten or fifteen grains. A tincture may be prepared by macerating three ounces of the bruised or powdered root in a pint of diluted alcohol for two weeks. Half an ounce of cinnamon or an ounce of orange-peel may be added to the other ingredients, to improve the flavour, and render the tincture more pleasant to the stomach. The dose is one or two fluidrachms. A syrup of rhatany is prepared by making a saturated cold infusion, and adding a sufficient quantity of sugar. It may be given to children in the dose of a teaspoonful. W.

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LACTUCA ELONGATA. *U.S. Secondary.*

Wild Lettuce.

"Lactuca elongata. Planta. *The Plant.*" *U.S.*

Lactuca. *Sex. Syst.* Syngenesia Æqualis.—*Nat. Ord.* Compositæ Cichoraceæ.

Gen. Ch. Receptacle naked. *Calyx* imbricated, cylindrical, with a membranous margin. *Pappus* simple, stipitate. *Seed* smooth. *Willd.*

Lactuca elongata. Willd. *Sp. Plant.* iii. 1525. This indigenous species of lettuce is biennial, with a stem from three to six feet in height, and leaves of which the lower are runcinate, entire, and clasping, the lowest toothed, and the highest lanceolate. They are all smooth on their under surface. The flowers are in corymbose panicles, small, and of a pale yellow colour. The stem and leaves yield, when wounded, a milky juice in which the virtues of the plant reside.

The *wild lettuce* grows in all latitudes of the United States, from Canada to the Carolinas. It is found in woods, along roads, and in fertile soils, and flowers in June and July.

It was introduced into the secondary list of the U. S. Pharmacopœia as a substitute for the *Lactuca virosa* of Europe, which it is said to resemble somewhat in medical properties. Dr. Bigelow was informed by physicians who had employed it, that it acts as an anodyne, and promotes the secretion from the skin and kidneys. It is seldom used in regular practice.

An extract prepared by expressing and inspissating the juice of the fresh plant may be given in doses of from five to fifteen grains. (*Bigelow's Sequel.*) W.

LACTUCA VIROSA. Folia. *Dub.*

Strong-scented Lettuce.

Off. Syn. LACTUCÆ VIROSÆ HERBA. *Ed.*

Laitue vireuse, *Fr.;* Gift-Lattig, *Germ.;* Lattuga salvatica, *Ital.*

Lactuca. See LACTUCA ELONGATA.

Lactuca virosa. Willd. *Sp. Plant.* iii. 1526; Woodv. *Med. Bot.* p. 75. t. 31. The strong-scented lettuce is biennial, with a stem from two to four feet high, erect, prickly near the base, above smooth and divided into branches. The lower leaves are large, oblong, obovate, undivided, toothed, commonly prickly on the under side of the midrib, sessile, and horizontal; the upper are smaller, clasping, and often lobed; the bractes are cordate and pointed. The flowers are numerous, of a sulphur-yellow colour, and disposed in a panicle. The plant is lactescent, and has a strong disagreeable smell like that of opium, and a bitterish acrid taste. The inspissated expressed juice is the only part used in medicine. It should be prepared while the plant is in flower, as the milky fluid, upon which its virtues depend, is then most abundant. The strong-scented lettuce is a native of Europe.

Medical Properties and Uses. The extract or inspissated juice is a sedative narcotic, said also to be gently laxative, powerfully diuretic, and somewhat diaphoretic. It is employed in Europe, particularly in Germany, in the treatment of dropsy, and is especially recommended in cases attended with visceral obstruction. Dr. Collin of Vienna was very successful with it in the cure of this disease. It is usually, however, combined with squill, digitalis, or some other diuretic; and it is not easy to decide how much of the effect obtained is justly ascribable to the lettuce. The medicine is never used in this country. The dose is eight or ten grains, which may be gradually increased to a scruple or more. The *Lactuca Scariola*, another European species, possesses similar properties, and is used for the same purposes.

Off. Prep. Succus Spissatus Lactucæ Virosæ. *Ed.* W.

LACTUCARIUM. *U.S., Ed.*

Lactucarium.

"Lactuca sativa. Succus concretus. *The concrete juice.*" *U.S.*

LACTUCA. *Lond.*

Lettuce.

"Lactuca sativa." *Lond.*

Off. Syn. LACTUCÆ SATIVÆ HERBA. *Ed.;* LACTUCA SATIVA. Herba. *Dub.*

Laitue, *Fr.;* Garten-Lattig, *Germ.;* Lattuga, *Ital.;* Lechuga, *Span.*

Lactuca. See LACTUCA ELONGATA.

Lactuca sativa. Willd. *Sp. Plant.* iii. 1523. The garden lettuce is an annual plant. The stem, which rises about two feet in height, is erect, round, simple below, and branching in its upper part. The lower leaves are obovate, rounded at the end, and undulating; the upper are smaller, sessile, cordate, and toothed; both are shining, and of a yellowish-green colour. The flowers are pale yellow, small, and disposed in an irregular terminal corymb. Before the flower-stem begins to shoot, the plant contains a bland, pellucid juice, has little taste or smell, and is much used as a salad for the table; but during the period of inflorescence it abounds in a peculiar milky juice, which readily escapes from incisions in the stem, and has been found to possess decided medicinal as well as sensible properties. A similar juice is produced by all the other species of lettuce, and has in fact served as the origin of the title by which the genus is designated. This juice is more abundant in the wild than in the cultivated plants. That of the *L. sativa*, inspissated by exposure to the air, has been adopted as officinal by the Edinburgh College, and has found a place in the secondary catalogue of the United States Pharmacopœia, under the name of *Lactucarium.*

The original native country of the garden lettuce is unknown. The plant has been cultivated from time immemorial, and is now employed in all parts of the civilized world. It flourishes equally well in hot and temperate latitudes. Some botanists suppose that the *L. virosa* of the old continent is the parent of all the varieties of the cultivated plant.

The milky juice undergoes little alteration, if confined in closely stopped bottles from which the air is excluded. But when exposed to the air, it concretes and assumes a brownish colour somewhat like that of opium. Mr. Young, of Edinburgh, recommends the following mode of collecting it. When the stem is about a foot high, the top is cut off, and the juice which exudes, being absorbed by cotton or a piece of sponge, is pressed out into a cup or other small vessel, and exposed till it concretes. In order to obtain all the juice which the plant is capable of affording, it is necessary to cut off five or six successive slices of the stem at short intervals, and to repeat the process two or three times a day. The juice may also be collected by the finger as it flows from the incisions. In its concrete state it bears a close resemblance to opium in colour, taste, and smell, and has sometimes been called lettuce opium. Its yields nearly half of its weight to water, with which it forms a deep brown infusion. From experiments made by Dr. Klink, assisted by Professor Pfaff of Kiel, the undissolved portion appears to consist of wax, resin, and caoutchouc. *Lactucarium* contains a free acid, and a peculiar narcotic principle; but is destitute of morphia. Procured in the manner above indicated, it is very expensive; and other modes have been proposed with a view to obviate this disadvantage.

A plan proposed by Mr. Probart of London, is to collect the milky juice on pieces of wove cotton about half a yard square, to throw these when fully charged into a vessel containing a small quantity of water, and allow the water thus impregnated to evaporate in shallow dishes at the ordinary temperature of the atmosphere. The lactucarium is left in the form of an extract, differing from the concrete juice chiefly in being destitute of caoutchouc. But prepared in this way also it is very expensive, in consequence of the smallness of the product.

Another method of extracting the virtues of the lettuce has been recommended by Mr. Probart. When the plant begins to assume a yellow hue, the white juice concretes in the bark of the stem, and in the old leaves, which become very bitter. These parts being separated, are macerated for twenty-four hours in water, then boiled for two hours; and the clear decoction, after having been allowed to drain off through a sieve without pressure, is evaporated in shallow vessels by simple exposure. The resulting extract, according to Mr. Probart, has half the strength of lactucarium, and may be obtained at one-sixth of the cost.

The London and Edinburgh Colleges direct an extract to be prepared by inspissating the expressed juice of the leaves; but this must be exceedingly uncertain, from the variable quantity of the milky juice contained in the plant; and as the young leaves, which contain little or none of it, are often employed, the preparation is liable to be quite inert. The proper lactucarium is greatly preferable.

Dr. Duncan erroneously states that the *thridace* of Dr. François is the expressed juice of lettuce. That practitioner employed the concrete milky juice obtained by incision.

Medical Properties and Uses. That lettuce possesses soporific properties, is a fact which was known to the ancients; but Professor Coxe, of Philadelphia, enjoys the credit of having first proposed the employment of its inspissated juice as a medicine. From experiments with a tincture prepared from lactucarium, or lettuce opium, as it has been called, Dr. Coxe obtained the same results as usually follow the administration of common laudanum. Dr. Duncan, senior, of Edinburgh, afterwards paid particular attention to the subject, and, in his treatise on pulmonary consumption, recommended lactucarium as a substitute for opium, the anodyne properties of which it possesses, without being followed by the same injurious effects. In consequence of this recommendation the medicine came into extensive use, and was adopted as officinal in several of the Pharmacopœias. Dr. François, a French physician, has also investigated, with great care, the medicinal properties of lactucarium. According to this author it is sedative in its action, diminishing the rapidity of the circulation, and consequently the temperature of the body, without producing that disturbance of the functions which often follows the use of opium. In this country the medicine is habitually employed by some practitioners to allay cough, and quiet nervous irritation.

The dose of lactucarium is two grains, to be repeated if necessary.

Water distilled from lettuce (*eau de laitue*) is used in France as a mild sedative, in the quantity of from two to four ounces. The fresh leaves boiled in water are sometimes employed in the shape of cataplasms. It is said that in Egypt a mild oil is derived from the seeds, fit for culinary use. (*Fée.*)

W.

LAURI BACCÆ ET FOLIA. *Lond.*

Berries and Leaves of the Bay Tree.

"Laurus nobilis. *Baccæ et Folia.*" *Lond.*

Off. Syn. LAURI NOBILIS BACCÆ. LAURI NOBILIS OLEUM EXPRESSUM. Ex Baccis. *Ed.;* LAURUS NOBILIS. Folia. Baccæ. *Dub.*

Laurier, *Fr.;* Lorbeer, *Germ.;* Allorg, *Ital.;* Laurel, *Span.*

Laurus. See CAMPHORA.

Laurus nobilis. Willd. *Sp. Plant.* ii. 479; Woodv. *Med. Bot.* p. 678. t. 235. This species of laurel is an evergreen tree, attaining in its native climate the height of twenty or thirty feet. Its leaves are alternate, on short petioles, oval lanceolate, entire, sometimes wavy, veined, of a firm texture, smooth, shining, deep green upon their upper surface, paler beneath. The flowers are diœcious, of a yellowish-white colour, and placed in small clusters of three or four together upon a common peduncle in the axils of the leaves. The corolla is divided into four oval segments. The fruit is an oval berry, of the size of a small cherry, and when ripe of a dark purple, nearly black colour.

The bay tree, so famous among the ancients, is a native of the countries bordering on the Mediterranean. Its leaves and fruit, and an oil expressed from the latter, are the officinal parts.

The leaves have a fragrant odour, especially when bruised, and a bitter, aromatic, somewhat astringent taste. They yield by distillation a greenish-yellow volatile oil, upon which their properties chiefly depend. Water distilled from them has their peculiar odour.

The berries when dried are black and wrinkled, and contain two oval, fatty seeds within a thin, friable envelope; or they may be considered as drupes, with a kernel divisible into two lobes. They have the same aromatic odour and taste as the leaves, but are more pungent. Besides an essential oil, they contain also a fixed oil, which may be separated by expression or decoction.

The expressed oil, which is obtained from the fresh fruit, is concrete, of a greenish colour, and retains a portion of the volatile oil, which renders it agreeably aromatic. Lard impregnated with the odorous principle of the berries, and coloured green, is said to be often substituted for the genuine expressed oil.

Medical Properties and Uses. The leaves, berries, and oil of the bay tree possess excitant and narcotic properties; but at present are never used internally as medicines, and in this country are scarcely employed in any manner. Their chief use is to communicate a pleasant odour to external stimulant remedies. Dr. A. T. Thomson says that he has found an infusion of the berries useful in impetigo. W.

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LAVANDULA. *U.S.*

Lavender.

"Lavandula spica. Flores. *The flowers.*" *U.S.*

Off. Syn. LAVANDULÆ FLORES. Lavandula Spica. Flores. *Lond.;*

LAVANDULÆ SPICÆ FLORES. *Ed.;* LAVANDULA SPICA. Flores. *Dub.*

Lavande, *Fr.;* Lavendelblumen, *Germ.;* Lavandola, *Ital.;* Espliego alhucema, *Span.*

LAVANDULA. *Sex. Syst.* Didynamia Gymnospermia.—*Nat. Ord.* Labiatæ.

Gen. Ch. *Calyx* ovate, somewhat toothed, supported by a bracte. *Corolla* resupine. *Stamens* within the tube. *Willd.*

Lavandula Spica. Willd. *Sp. Plant.* iii. 60; Woodv. *Med. Bot.* p. 321. t. 114.—*L. vera*, De Cand. *Flor. Fr. Sup.* p. 398. The *Lavandula Spica* of Linnæus includes two distinct species, which were considered by him merely as varieties of the same plant, but have been separated by subsequent botanists. Of these, the officinal plant, the narrow-leaved variety of Linnæus, has been denominated by De Candolle *L. vera*, while the broad-leaved variety still retains the title of *L. Spica.* It is the former which is intended by the Pharmacopœias, as the latter is scarcely cultivated in Great Britain or the United States.

The common lavender is a small shrub, usually rising not more than two or three feet, but sometimes attaining an elevation of six feet. The stem is woody below, and covered with a brown bark; above, is divided into numerous slender, straight, herbaceous, pubescent, quadrangular branches, furnished with opposite, sessile, narrow, nearly linear, entire, and green or glaucous leaves. The flowers are small, blue, and disposed in interrupted whorls around the young shoots, forming terminal cylindrical spikes. Each whorl is accompanied with two bractes. The corolla is tubular and labiate, with the lower lip divided into three segments, the upper larger and bifid. The filaments are within the tube.

The plant is a native of Southern Europe, and covers vast tracts of dry and barren land in Spain, Italy, and the South of France. It is cultivated abundantly in our gardens, and in this country flowers in August. All parts of it are endowed with properties similar to those for which the flowers are used; but these only are officinal. The spikes should be cut when they begin to bloom.

Lavender flowers have a strong fragrant odour, and an aromatic, warm, bitterish taste. They retain their fragrance a long time after drying. Alcohol extracts their virtues; and a volatile oil upon which their odour depends rises with that liquid in distillation. The oil may be procured separate by distilling the flowers with water. (See *Oleum Lavandulæ.*) Hagen obtained from a pound of the fresh flowers sometimes two drachms, sometimes only half a drachm of the oil.

Medical Properties and Uses. Lavender is an aromatic stimulant and tonic, esteemed useful in certain conditions of nervous debility, but very seldom given in its crude state. The products obtained by its distillation are much used in perfumery, and as grateful additions to other medicines, which they render at the same time more acceptable to the palate and cordial to the stomach.

Off. Prep. Oleum Lavandulæ, *U.S., Lond., Ed., Dub.;* Pulvis Asari Compositus, *Ed., Dub.;* Spiritus Lavandulæ, *U.S., Lond., Ed., Dub.;* Spiritus Lavandulæ Compositus, *U.S., Lond., Ed., Dub.* W.

LICHEN. *U.S.*

Iceland Moss.

"Cetraria Islandica. *Acharius.* Lichen Islandicus. *Linn.* Planta. *The Plant.*" *U.S.*

Off. Syn. LICHEN. Lichen Islandicus. *Lond.;* LICHEN ISLANDICUS. *Ed.;* LICHEN ISLANDICUS. CETRARIA ISLANDICA. Planta. *Dub.*

Lichen d'Islande, *Fr.;* Islandiches Moos, *Germ.;* Lichene Islandico, *Ital.;* Liquen Islandico, *Span.*

CETRARIA. *Sex. Syst.* Cryptogamia Lichenes.—*Nat. Ord.* Lichenes.

Gen. Ch. Plant cartilagino-membranous, ascending or spreading, lobed, smooth, and naked on both sides. *Apothecia* shield-like, obliquely adnate with the margin, the disk coloured, plano-concave; border inflexed, derived from the frond. *Loudon's Encyc.*

The genus *Lichen* of Linnæus has been divided by subsequent botanists into numerous genera, which have been raised to the dignity of a distinct order, both in the natural and artificial systems of arrangement. The name *Cetraria* was conferred by Acharius on the genus to which the Iceland moss belongs.

Cetraria Islandica. Acharius. *Lichenog. Univ.* 512.—*Lichen Islandicus.* Woodv. *Med. Bot.* p. 803. t. 271. Iceland moss is foliaceous, erect, from two to four inches high, with a dry, coriaceous, smooth, shining, laciniated frond or leaf, the lobes of which are irregularly subdivided, channeled, and fringed at their edges with rigid hairs. Those divisions upon which the fruit is borne are dilated. The colour is olive-brown or greenish-gray above, reddish at the base, and lighter on the under than the upper surface. The fructification is in flat, shield-like, reddish-brown receptacles, with elevated entire edges, placed upon the surface of the frond near its border.

The plant is found in the northern latitudes of the old and new continents; and on the elevated mountains further south. It received its name from the abundance in which it prevails in Iceland. It is also abundant on the mountains and in the sandy plains of New England.

The dried moss is of diversified colour, grayish-white, brown, and red in its different parts, with less of the green tint than in the recent state. It is inodorous, and has a mucilaginous, bitter taste. Macerated in water it absorbs rather more than its own weight of the fluid, and, if the water be warm, renders it bitter. Boiling water extracts all its soluble principles. The decoction thickens upon cooling, and acquires a gelatinous consistence, resembling that of starch in appearance, but without its viscidity. After some time the dissolved matter separates, and when dried forms semitransparent masses, insoluble in cold, but soluble in boiling water, from which it is precipitated by gallic acid. This principle resembles starch in its general characters, but differs from it in some respects, particularly in not being coloured blue by iodine. John considers it a modification of inulin. The most accurate analysis of Iceland moss is that by Berzelius. By this chemist 100 parts were found to afford 1.6 of chlorophylle, 3.0 of a peculiar bitter principle, 3.6 of uncrystallizable sugar, 3.7 of gum, 7.0 of the apotheme of extractive, 44.6 of the peculiar starch-like principle, 1.9 of the bilichenates of potassa and lime mixed with phosphate of lime, and 36.2 of amilaceous fibrin—the excess being 1.6 parts. (*Traité de Chim.* vi. 251.) The bitter principle is, when pure, pulverulent, light, yellow, inodorous, intensely bitter, slightly soluble in water, more so in alcohol, and freely soluble in the liquid alkalies.

The gum and starch contained in the moss render it sufficiently nutritive to serve as food for the inhabitants of Iceland and Lapland, who employ it powdered and made into bread, or boiled with milk, having first partially freed it from the bitter principle by repeated maceration in water. The bitterness may be entirely extracted by macerating the powdered moss, for twenty-four hours, in twenty-four times its weight of a solution formed with 1 part of an alkaline carbonate and 375 parts of water, decanting the liquid at the end of this time, and repeating the process with an equal quantity of the solution. The powder being now dried is perfectly sweet and highly nutritive. This process was suggested by Berzelius.

Medical Properties and Uses. Iceland moss is at the same time demulcent, nutritious, and tonic; and therefore well calculated for affections of the mucous membrane of the lungs and bowels, in which the local disease is associated with a debilitated condition of the digestive organs, or of the system generally. Hence it has been found useful in chronic catarrhs, and other pulmonary affections attended with copious and debilitating expectoration, especially when the matter discharged is of a purulent character; as also in dyspepsia, chronic dysentery, and diarrhœa. It has, moreover, been given in cases of debility succeeding acute disease, or dependent on copious purulent discharge from external ulcers. But the complaint in the treatment of which it has acquired most reputation is pulmonary consumption. It had long been employed in this disease, and in hæmoptysis, by the Danish physicians, before it became known to the profession at large. In the latter half of the last century it was introduced into extensive use; and numerous cases of cures supposed to have been effected by it are on record. But now that the pathology of consumption is understood, physicians have ceased to expect material advantage from it in the genuine tuberculous form of the disease; and there is reason to believe that the cases which have recovered under its use, were nothing more than chronic bronchitis or catarrh, or possibly ulceration dependent on ordinary inflammation of the pulmonary tissue. It can act only as a mild, nutritious, demulcent tonic; and certainly exercises no specific influence over tuberculous disease.

It is usually employed in the form of decoction. (See *Decoctum Lichenis.*) By some writers it is recommended to deprive it of the bitter principle by maceration in water, or a weak alkaline solution, before preparing the decoction; but we thus reduce it to the state of a simple demulcent, or mild article of diet, in which respect it is not superior to the ordinary farinaceous or gummy substances used in medicine. The powder is sometimes given in the dose of thirty grains or a drachm; and a preparation has obtained some repute, in which the ground moss is incorporated with chocolate, and used at the morning and evening meal as an ordinary beverage.

Off. Prep. Decoctum Lichenis, *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

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LIMON. *U.S.*

Lemons.

"Citrus medica. Fructus. *The fruit.*" *U. S.*

Off. Syn. LIMONES. Citrus medica. Baccæ. LIMONUM CORTEX.

Earum Cortex exterior. *Lond.;* CITRI MEDICÆ CORTEX. Cortex exterior Fructûs. CITRI MEDICÆ SUCCUS. Succus Fructûs. *Ed.;* LIMONES. CITRUS MEDICA. Fructûs succus, et tunica exterior. *Dub.*

Limons, Citrons, *Fr.;* Limonen, Citronen, *Germ.;* Limoni, *Ital.;* Limones, *Span.*

For some general remarks on the genus CITRUS, see the article *Aurantii Cortex.*

Citrus medica. Willd. *Sp. Plant.* iii. 1426; Woodv. *Med. Bot.* p. 528, t. 189. This tree closely resembles in its general aspect the *C. Aurantium* before described. The leaves, however, are larger, slightly indented at the edges, and stand upon footstalks which are destitute of the winged appendages that characterize the other species. The flowers, moreover, have a purplish tinge on their outer surface; and the fruit is entirely different in appearance from the orange. There are several varieties of the *Citrus medica*, which some botanists consider entitled to the rank of species, but which are scarcely distinguishable, except by the character of their fruit. Those which are particularly deserving of notice are the citron, lemon, and lime. 1. In the citron, *C. medica* of Risso, the fruit is very large, sometimes six inches in length, ovoidal with a double rind, of which the outer layer is yellowish, thin, unequal, rugged, with innumerable vesicles filled with essential oil; the inner is white, very thick, and spongy. It is divided in the interior into nine or ten cells, filled with oblong vesicles, which contain an acid juice precisely like that of the lemon, and used for the same purposes. The rind is applied to the preparation of conserves, to which it is adapted by its great thickness. This fruit is called *cedrat* by the French. 2. The lemon—*C. medica*, variety *limon* of Linnæus—the *Citrus Limonium* of Risso—is smaller than the preceding variety, with a smoother and thinner rind, a pointed nipple-shaped summit, and a very juicy and acid pulp. In other respects it bears a close resemblance to the citron, to which, however, it is usually preferred in consequence of the greater abundance of its juice. 3. The lime is still smaller than the lemon, with a smoother and thinner rind, of an oval shape, rounded at the extremities, of a pale yellow or greenish-yellow colour, and abounding in a very acid juice, which renders it highly useful for all the purposes to which the lemon is applied. It is the product of the variety *C. acris* of Miller.

The *Citrus medica*, like the orange-tree, is a native of Asia. It was introduced into Europe from Persia or Media, was first cultivated in Greece, afterwards in Italy so early as the second century, and has now spread over the whole civilized world, being raised by artificial heat, where the climate is too cold to admit of its exposure with safety during winter to the open air.

We are supplied with lemons and limes chiefly from the West Indies and the Mediterranean. Though the former of these fruits only is directed by the United States Pharmacopœia, both kinds are employed indiscriminately for most medicinal purposes; and the lime affords a juice at least equal in proportional quantity, and in acidity, to that obtained from the lemon.

Properties. The exterior rind of the lemon has a fragrant odour, and a warm, aromatic, bitter taste, somewhat similar to that of the orange, though less agreeable. It yields, by expression or distillation, an essential oil which is much used for its flavour, and is recognised as officinal in all the Pharmacopœias. (See *Oleum Limonis.*) The British Colleges also adopt the rind itself, and that of Edinburgh directs a distilled water to be prepared from it. Lemon-peel yields its virtues to water, wine, and alcohol.

But the juice is the part for which this fruit is most esteemed. It is very sharply acid, with a peculiar grateful flavour, and consists chiefly of citric acid, mucilage, and extractive, dissolved in water. As lemons cannot always be obtained, the juice is often kept in a separate state; but from its liability to spontaneous decomposition, it speedily becomes unfit for medical use; and though various means have been resorted to for its preservation, it can never be made to retain for any length of time its original flavour unaltered. The best medicinal substitute for lemon-juice, when the fresh fruit is not attainable, is a solution of crystallized citric acid in water, in the proportion of about an ounce to the pint, with the addition of a little oil of lemons.* One of the most effectual methods of preserving the juice is to allow it to stand for a short time after expression till a coagulable matter separates, then to filter, and introduce it into glass bottles, with a stratum of almond oil or other sweet oil upon its surface. It may also be preserved by concentrating it either by means of evaporation with a gentle heat, or by exposure to a freezing temperature, which congeals the watery portion, and leaves the acid much stronger than before. When wanted for use it may be diluted to the former strength; but though the acid properties are retained, the flavour of the juice is found to have been deteriorated.

Medical Properties and Uses. The rind of the lemon is sometimes used to qualify the taste and increase the power of stomachic infusions and tinctures. The juice is refrigerant, and properly diluted forms a refreshing and very agreeable beverage in febrile and inflammatory affections. It may be given with sweetened water in the shape of lemonade, or may be added to the mildly nutritive drinks, such as gum-water, barley-water, &c., which are usually administered in fevers. It is also much employed in the formation of those diaphoretic preparations known generally by the names of *neutral mixture*, and *effervescing draught*—the former made by saturating the juice with carbonate of potassa, and given in the dose of half a fluidounce diluted with an equal quantity of water every hour, two, or three hours; the latter consisting of the same ingredients administered in the state of effervescence. No preparation with which we are acquainted is equally effectual with the *effervescing draught*, in allaying irritability of stomach and producing diaphoresis in our remittent fevers. The most convenient mode of exhibition, is to add to a fluidounce of a mixture consisting of equal parts of lemon-juice and water, half a fluidounce of a solution of carbonate of potassa, containing fifteen grains of the salt. Should effervescence not occur, as sometimes happens in consequence of the weakness of the lemon-juice, more of this should be added; as, unless sufficient acid is present to neutralize the potassa, part of the carbonate passes into the state of bicarbonate, and the gas is thus prevented from escaping. One of the most beneficial applications of lemon-juice is to the prevention and cure of scurvy, for which it may be considered almost a specific. For this purpose, ships destined for long voyages should always be provided with a supply of the concentrated juice, or of crystallized citric acid with the oil of lemons. Lemon-juice is sometimes prescribed in connexion with opium and Peruvian bark, the effects of which it is thought in some instances to modify favourably, by substituting the citrate of their respective alkalies for the native salts.

Off. Prep. Of the rind, Aqua Citri Medicæ, *Ed.;* Infusum Aurantii Comp., *Lond.*, *Dub.;* Infusum Gentianæ Comp., *Lond.*, *Dub.:—Of the juice*, Acidum Citricum, *Lond.*, *Dub.;* Syrupus Limonis, *U.S.*, *Lond.*, *Ed.*, *Dub.*

W.

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* Nine drachms and a half dissolved in a pint of water, forms a solution of the average strength of lime-juice; but where precision is not requisite, the proportion mentioned in the text is most convenient.

LINUM. *U.S.*

Flaxseed.

"Linum usitatissimum. Semina. *The seeds.*" *U.S.*

Off. Syn. LINI USITATISSIMI SEMINA. Linum usitatissimum. Semina. *Lond.;* LINI USITATISSIMI SEMINA. *Ed.;* LINUM USITATISSIMUM. Semina. *Dub.*

Linseed; Grains de lin, *Fr.;* Leinsame, *Germ.;* Semi di lino, *Ital.;* Linaza, *Span.*

LINUM. *Sex. Syst.* Pentandria Pentagynia.—*Nat. Ord.* Lineæ.

Gen. Ch. Calyx five-leaved. *Petals* five. *Capsule* five-valved, ten-celled. *Seeds* solitary. *Willd.*

Linum usitatissimum. Willd. *Sp. Plant.* i. 1533; Woodv. *Med. Bot.* p. 566. t. 202. Common flax is an annual plant with an erect, slender, round stem, about two feet in height, branching at top, and, like all other parts of the plant, entirely smooth. The leaves are small, lanceolate, acute, entire, of a pale-green colour, sessile, and scattered alternately over the stem and branches. The flowers are terminal and of a delicate blue colour. The calyx is persistent, and composed of five ovate, sharp-pointed, three nerved leaflets, which are membranous on their border. The petals are five, obovate, striated, minutely scolloped at their extremities, and spread into funnel-shaped blossoms. The filaments are also five, united at the base; and the germ, which is ovate, supports five slender styles, terminating in obtuse stigmas. The fruit is a globular capsule, about the size of a small pea, having the persistent calyx at the base, crowned with a sharp spine, and containing ten seeds in distinct cells.

This highly valuable plant, now almost everywhere cultivated, is said by some to have been originally derived from Egypt, by others from the great elevated plain of central Asia. It flowers in June and July, and ripens its seeds in August. Both the seeds, and an oil expressed from them, are officinal.

The seeds are oval, oblong, flattened on the sides with acute edges, somewhat pointed at one end, about a line in length, smooth, glossy, of a brown colour externally, and yellowish-white within. They are without smell, and have an oily mucilaginous taste. Their cuticle abounds in a peculiar gummy matter, which is readily imparted to hot water, forming a thick viscid mucilaginous fluid, bearing some resemblance to the solution of gum Arabic, but differing from it in several respects. It ranks among the mucilages of Berzelius. By this chemist the term *mucilage* is applied to a proximate vegetable principle, distinguished from gum by being insoluble in cold, and but slightly soluble in boiling water, in which it swells up and forms a mucilaginous, viscid body, which loses its water when placed upon filtering paper, or other porous substance, and contracts like starch in the gelatinous state. The name, however, is unfortunate, as it is generally applied to the solution of gum, and must inevitably lead to confusion. This principle is found in tragacanth, Bassora gum, cherry gum, quince seeds, and various other vegetable products. The mucilaginous fluid formed by treating it with a large proportion of cold water, is not considered by Berzelius as a proper solution, but as constituting an intermediate state between solution and mere swelling up (gonflement); for if a small proportion of water be used, a viscid mass is formed, which imparts to blotting paper on which it may be placed, a liquid in no degree mucilaginous. The mucilage of flaxseed lets fall white flakes upon the addition of alcohol, and affords a copious dense precipitate with the acetate and subacetate of lead. Like gum it yields much mucic (saclactic) acid, when treated with nitric acid. By destructive distillation it affords considerable ammonia, and therefore contains nitrogen. Vauquelin found among its constituents free acetic acid, silica, and various salts of potassa and lime.

According to Guérin, the mucilage of flaxseed, obtained at a temperature of from 120° to 140°, and evaporated to dryness by means of a salt bath, contains, in 100 parts, 52.70 of a principle soluble in cold water, 29.89 of a principle insoluble in that liquid, and 10.30 of water, and yields 7.11 per cent. of ashes. The soluble part he believes to be arabin or pure gum; the insoluble he found not to afford mucic acid with the nitric, and therefore to differ from both bassorin and cerasin. There was also a small proportion of azotized matter which he did not succeed in isolating. (*An. de Chim. et Phys.* xlix. 263.)

The interior or parenchymatous part of the seeds is rich in a peculiar oil, which is separated by expression, and very extensively employed in the arts. (See *Oleum Lini.*) The ground seeds are kept in the shops under the name of *flaxseed meal.* This is of a dark gray colour, highly oleaginous, and when mixed with hot water forms a soft adhesive mass, which is much employed for luting by practical chemists. The cake which remains after the expression of the oil still retains the mucilaginous matter of the envelope, and affords a highly nutritious food for cattle.

Medical Properties and Uses. Flaxseed is demulcent and emollient. The mucilage obtained by infusing the entire seeds in boiling water, in the proportion of half an ounce to the pint, is much and very advantageously employed in catarrh, dysentery, nephritic and calculous complaints, strangury, and other inflammatory affections of the mucous membrane of the lungs, intestines, and urinary passages. By decoction water extracts also a portion of the oleaginous matter, which renders the mucilage less fit for administration by the mouth, but superior as a laxative enema. The meal mixed with hot water forms an excellent emollient poultice.

Off. Prep. Cataplasma Sinapis, *Lond.*, *Dub.;* Infusum Lini, *U. S.*, *Lond.*, *Ed.*, *Dub.;* Oleum Lini., *Lond.*, *Ed.*, *Dub.*; Pulvis pro Cataplasmate, *Dub.*

W.

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LINUM CATHARTICUM. *Lond.*

Purging Flax.

Lin cathartique, *Fr.;* Purgirflachs, *Germ.;* Lino purgativo, *Ital.*

LINUM. See LINUM.

Linum catharticum. Willd. *Sp. Plant.* i. 1541; Smith, *Flor. Brit.* 344.

This species of flax is a very small annual plant, having erect, slender stems, dichotomous near the summit, furnished with opposite, obovate, lanceolate, entire leaves, and bearing minute white flowers, the petals of which are obovate and acute. It is a native of Europe, and not found within the United States, where it is never employed as a medicine.

The herbaceous part is bitter and somewhat acrid, and imparts its virtues to water, which acquires a yellow colour. It formerly enjoyed some reputation in Europe as a gentle cathartic, but has fallen into disuse, and might very properly be expunged altogether from the officinal catalogues.

W.

LIRIODENDRON. *U.S. Secondary.*

Tulip-tree Bark.

"Liriodendron tulipifera. Cortex. *The bark.*" *U.S.*

LIRIODENDRON. *Sex. Syst.* Polyandria Polygynia.—*Nat. Ord.* Magnoliaceæ.

Gen. Ch. Calyx three-leaved. *Petals* six. *Samaræ* sublanceolate, one or two-seeded, imbricated in a cone. *Nuttall.*

Liriodendron tulipifera. Willd. *Sp. Plant.* ii. 1254; Bigelow, *Am. Med. Bot.* ii. 107; Barton, *Med. Bot.* i. 92. This noble tree is both from its magnitude and beauty the pride and boast of American landscape. Rising on an erect, straight, cylindrical stem, which is often of nearly equal thickness for the distance of forty feet, it attains, in favourable situations, an elevation seldom less than fifty and sometimes more than one hundred feet, with a diameter of trunk varying from eighteen inches to three feet; and individuals are occasionally met with which greatly exceed these dimensions. The branches, though not very numerous, are thrown out in a somewhat regular order, and give the tree a symmetrical aspect. The bark of the stem and branches is smooth in the young trees, but in those of older growth is indented with longitudinal cracks or furrows of a depth proportioned to the age. It is of a brown or grayish-brown colour, except in the young branches, on which it is bluish or of a reddish tinge. The leaves, which stand on long footstalks, are alternate, somewhat fleshy, smooth, of a beautiful shining green colour, and divided into three lobes, of which the upper one is truncated and horizontally notched at its summit, so as to present a two-lobed appearance, and the two lower are rounded at the base and usually pointed. In the larger leaves, the lateral lobes have each a tooth-like projection at some distance below their apex. This peculiar form of the leaf serves to distinguish the tree from all others inhabiting the American forests. On isolated trees the flowers are very numerous. They are large, beautifully variegated with different colours, among which the yellow predominates, and in their general appearance bear no inconsiderable resemblance to the tulip, which has given a name to the species. Each flower stands on a distinct terminal peduncle. The calyx is double, the outer being two-leaved and deciduous, the inner consisting of three large, oval, concave leaves, of a pale green colour. The corolla is composed of six, seven, or more, obtuse, concave petals. The stamens are numerous, with short filaments, and long linear anthers. The pistils are collected into the form of a cone, the upper part of which is covered with minute stigmas. The fruit consists of numerous long, narrow scales, attached to a common axis, imbricated in a conical form, and containing each two seeds, one or both of which are often abortive.

The tulip-tree extends from New England to the borders of Florida, but is most abundant and attains the greatest magnitude in the Middle and Western States. It delights in a rich strong soil, and luxuriates in the exhaustless fertility of the banks of the Ohio and its tributary streams. Throughout the United States it is known by the inappropriate name of *poplar*, for which that of *tulip-tree* is beginning to be substituted. When in full bloom, about the middle of May, it presents in its profusion of flowers, its rich, shining, luxuriant foliage, its elevated stature, and elegant outline, one of the most magnificent objects which the vegetable kingdom affords. The interior or heart wood, which is yellowish, of a fine grain, and compact without being heavy, is much employed in the making of furniture, carriages, door-pannels, and for other useful purposes. It is recommended by its property of resisting the influence of atmospheric moisture, and the attacks of worms. The bark is the officinal portion. It is taken for use indiscriminately from the root, trunk, and branches, though that derived from the root is thought to be most active.

It is brought to the druggists in pieces of various sizes, usually five or six inches long by one or two in breadth, partially deprived of epidermis, of a yellowish-white colour, very light, and easily broken. The bark of the root is of a somewhat darker colour than that of the stem or branches. It has a feeble, but heavy and rather disagreeable odour, which is stronger in the fresh bark. The taste is bitter, pungent, and aromatic. These properties are weakened by age, and we have found specimens of the bark which have been long kept in the shops, almost insipid. The peculiar properties of liriodendron appear to reside in a volatile principle, which partially escapes during decoction. This principle has been isolated by Professor Emmet of the University of Virginia, from whom it has received the name of *liriodendrin.* In the pure state it is solid, white, crystallizable, brittle, insoluble in water, soluble in alcohol and ether, fusible at 180°, volatilizable and partly decomposed at 270°, of a slightly aromatic odour, and a bitter warm pungent taste. It appears, like camphor, to hold a place between the resins and essential oils. It is incapable of uniting with alkalies, which precipitate it from the infusion or decoction of the bark, by combining with the matter which renders it soluble in the water. Neither does it unite with acids. Water precipitates it from its alcoholic solution. It is obtained by macerating the root in alcohol, boiling the tincture with magnesia till it assumes an olive-green colour, then filtering, concentrating by distillation till the liquid becomes turbid, and finally precipitating the liriodendrin by the addition of cold water. (*Journ. of the Phil. Col. of Pharm.* iii. 5.) The virtues of the bark are extracted by water and alcohol, but are injured by long boiling.

Medical Properties. Liriodendron is a stimulant tonic with diaphoretic properties. It has been used as a substitute for Peruvian bark in intermittent fevers, and has proved serviceable in chronic rheumatism, dyspepsia, and other complaints, in which a gently stimulant and tonic impression is desirable. The dose of the bark in powder is from half a drachm to two drachms. The infusion and decoction are also used, but are less efficient. They may be prepared in the proportion of an ounce of the bark to a pint of water, and given in the quantity of one or two fluidounces. The dose of the saturated tincture is a fluidrachm. W.

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LITMUS. *Dub.*

Litmus.

"Roccella tinctoria." *Dub.*

Turnsol, Orchill; Tournesol, *Fr.;* Lakmus, *Germ.;* Oricello, *Ital.;* Orchilla, *Span.*

Various species of lichens afford, when macerated with alkaline liquors, a purple colouring matter much esteemed in dyeing. That most used at present is the *cudbear,* prepared from the *Lichen tartareus* which grows on limestone rocks in the North of Europe. The *orchill* or *litmus* is a similar dye-stuff, prepared from the *Roccella tinctoria* of Acharius, a lichen which grows on maritime rocks, and is especially abundant in the Canary and Cape Verd Islands.

Litmus is prepared by coarsely powdering the lichen, and macerating and fermenting it in close wooden vessels, for several weeks, with urine and either potash or soda. The colouring matter is thus evolved, and the prepared mass is taken out, dried, and cut into small squares for use.

Litmus as thus prepared, is in friable, violet-coloured, finely granular pieces, from a quarter of an inch to an inch in diameter, scattered over with white saline points. It has an alkaline smell, tinges the saliva of a deep blue, and is somewhat pungent and saline to the taste. It is much used as one of the most delicate tests of uncombined acids, which change its blue colour to red; and of alkalies, which restore the original hue. The most convenient mode of preparing litmus for use as a test, is to stain paper with it. For this purpose the watery infusion made with one part of powdered litmus and four of water, is applied by means of a brush to white unsized paper. The sheets when dried must be kept in close vessels in the dark.

D. B. S.

LOBELIA. *U. S.*

Indian Tobacco.

"Lobelia inflata. Herba. *The herb.*" *U. S.*

Lobelia. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Lobeliaceæ.

Gen. Ch. *Calyx* five-cleft. *Corolla* irregular, five-parted, cleft on the upper side nearly to the base. *Anthers* united into a tube. *Stigma* two lobed. *Capsule* inferior or semi-superior, two or three-celled, two-valved at the apex. *Torrey.*

Lobelia inflata. Willd. *Sp. Plant.* i. 946; Bigelow, *Am. Med. Bot.* i. 177; Barton, *Med. Bot.* i. 181. The Indian tobacco is an annual or biennial indigenous plant, usually a foot or more in height, with a fibrous root, and a solitary, erect, angular, very hairy stem, much branched about midway, but rising considerably above the summits of the highest branches. The leaves are scattered, sessile, oval, acute, serrate, and hairy. The flowers are numerous, disposed in leafy terminal racemes, and supported on short axillary footstalks. The segments of the calyx are linear and pointed. The corolla, which is of a delicate blue colour, has a labiate border, with the upper lip divided into two, the lower into three acute segments. The united anthers are curved, and enclose the stigma. The fruit is an oval, striated, inflated capsule, crowned with the persistent calyx, and containing, in two cells, numerous very small, brown seeds.

This species of Lobelia is a very common weed, growing on the roadsides, and in neglected fields, throughout the United States. Its flowers begin to appear towards the end of July, and continue to expand in succession till the occurrence of frost. The plant when wounded or broken exudes a milky juice. All parts of it are possessed of medicinal activity; but, according to Dr. Eberle, the root and inflated capsules are most powerful. The plant should be collected in August or September, when the capsules are numerous, and should be carefully dried. It may be kept whole, or in the state of powder.

Dried lobelia has a slight irritating odour, and when chewed, though at first without much taste, soon produces a burning acrid impression upon the posterior parts of the tongue and palate, very closely resembling that occasioned by tobacco, and attended, in like manner, with a flow of saliva and a nauseating effect upon the stomach. The powder is of a greenish colour. The plant yields its active properties readily to water and alcohol; and water distilled from it retains its acrid taste. It has not been accurately analyzed.

Medical Properties and Uses. Lobelia is emetic, and like other medicines of the same class is occasionally cathartic, and in small doses diaphoretic and expectorant. It is also possessed of narcotic properties. The leaves or capsules, chewed for a short time, occasion giddiness, headach, general tremors, and ultimately nausea and vomiting. When swallowed in the full dose, the medicine produces speedy and severe vomiting, attended with continued and distressing nausea, copious sweating, and great general relaxation. Its effects in doses too large or too frequently repeated, are extreme prostration, great anxiety and distress, and ultimately death preceded by convulsions. Fatal results have been experienced from its empyrical use. These are more apt to occur when the poison, as sometimes happens, is not rejected by vomiting. In its operation upon the system, therefore, as well as in its sensible properties, lobelia bears a close resemblance to tobacco. It is among the medicines which were employed by the aborigines of this country; and was long in the hands of empyrics before it was introduced into regular practice. The Rev. Dr. Cutler of Massachusetts first attracted to it the attention of the profession.

As an emetic it is too powerful, and too distressing as well as hazardous in its operation for ordinary use. The disease in which it has proved most useful is spasmodic asthma, the paroxysms of which it often greatly mitigates, and sometimes wholly relieves, even when not given in doses sufficiently large to produce active vomiting. It was from the relief obtained from an attack of this complaint in his own person, that Dr. Cutler was induced to recommend the medicine. It has also been used in catarrh, croup, pertussis, and other pectoral affections, but generally with no better effect than may be obtained from less unpleasant and safer remedies. Administered by injection it produces the same distressing sickness of stomach, profuse perspiration, and universal relaxation as result from a similar use of tobacco. Dr. Eberle administered a strong decoction of it successfully by the rectum, as a substitute for this narcotic in a case of strangulated hernia.

It may be given in substance, tincture, or infusion. The dose of the powder as an emetic is from five to twenty grains, to be repeated if necessary. The tincture is most frequently administered. The full dose of this preparation for an adult is half a fluidounce, though in asthmatic cases it is better administered in the quantity of one or two fluidrachms, repeated every two or three hours till its effects are experienced.

Two other species of Lobelia have attracted some attention from medical writers. The *L. cardinalis*, or *cardinal flower*, distinguished for its showy red flowers, is supposed to possess anthelmintic properties; but is seldom or never used. The *L. syphilitica* is said to have been used by the Indians in the cure of the venereal disease, but has upon trial been found wholly inefficacious in that complaint. It is emetic and cathartic, and appears also to possess diuretic properties, whence it has been conjectured that it might have proved serviceable in gonorrhœa. Dr. Chapman states that it has been employed, as he has been informed, by some practitioners of the western country in dropsy, and not without success. The root is the part used. Both these species of Lobelia are indigenous. For a more detailed account of them the reader is referred to Dr. W. P. C. Barton's Medical Botany.

Off. Prep. Tinctura Lobeliæ, *U.S.* W.

LUPULINA. *U.S.*

Lupulin.

"Humulus lupulus. Strobilorum pollen. *The powder attached to the strobiles.*" *U.S.*

See HUMULUS.

LYCOPUS. *U.S. Secondary.*

Bugle-weed.

"Lycopus Virginicus. Herba. *The Herb.*" *U.S.*

Lycopus. *Sex. Syst.* Diandria Monogynia.—*Nat. Ord.* Labiatæ.

Gen. Ch. Calyx tubular, five-cleft or five-toothed. *Corolla* tubular, four-lobed, nearly equal; the upper segment broader, and emarginate. *Stamens* distant. *Seeds* four, naked, retuse. *Nuttall.*

Lycopus Virginicus. Michaux, *Flor. Boreal. Americ.*, i. 14; Rafinesque, *Med. Flor.* vol. ii. The *bugle-weed* is an indigenous herb, with a perennial creeping root, which sends up an erect, nearly simple, obtusely quadrangular stem, from twelve to eighteen inches high, and furnished with opposite, sessile leaves. These are broad lanceolate, attenuated and entire at both extremities, remotely serrate in the middle, somewhat rough, purplish and beset with glandular dots on their under surface. The flowers are minute, in small axillary whorls, with two small subulate bractes to each flower, and a white corolla. The seeds are longer than the calyx, which is spineless.

This plant grows in shady and wet places throughout the greater part of the United States. Its flowering period is August. The whole herb is used. It has a peculiar odour, and a nauseous slightly bitter taste, and imparts these properties, as well as its medical virtues, to boiling water.

The *L. Europæus* is said to be frequently collected and sold for the *L. Virginicus.* The former may be distinguished by its acutely quadrangular stem, its narrow-lanceolate leaves of which the lower are somewhat pinnatifid, its more crowded flowers, and the acute segments of its calyx, armed with short spines.

Medical Properties and Uses. According to Dr. A. W. Ives, the bugle-weed is a very mild narcotic. It was introduced into notice by Drs. Pendleton and Rogers, of New York, who obtained favourable effects from its use in incipient phthisis and hemorrhage from the lungs. (*N. Y. Med. and Phys. Journ.* i. 179.) In these complaints it is useful by diminishing the frequency of the pulse, quieting irritation, and allaying cough. It is most conveniently taken in the form of infusion, which may be prepared by macerating an ounce of the herb in a pint of boiling water, and drank ad libitum. W.

LYTHRUM SALICARIA. Herba. *Dub.*

Loosestrife. Purple Willow-herb.

Salicaire, *Fr.;* Rother Weiderich, *Germ.;* Salicaria, *Ital.*

Lythrum. *Sex. Syst.* Dodecandria Monogynia.—*Nat. Ord.* Salicareæ.

Gen. Ch. Calyx twelve toothed. *Petals* six, inserted into the calyx. *Capsule* two-celled, many-seeded. *Willd.*

Lythrum Salicaria. Willd. *Sp. Plant.* ii. 865. Loosestrife is an elegant perennial plant, two or three feet high, with an erect, quadrangular or hexagonal, downy, herbaceous stem, bearing opposite, ternate, sessile, lanceolate leaves, cordate at the base, and downy on the under surface and at the margin. The flowers are axillary, forming a leafy verticillate spike. The calyx is red, with unequal segments, the petals purple and undulate, the fruit a small elliptical capsule.

The plant grows wild in all parts of Europe, and is found in New England and Canada. It prefers meadows, swamps, and the banks of streams, which it adorns in July and August, with its showy purple flowers. The whole herbaceous part is medicinal, and is dried for use.

In this state it is inodorous, and has an herbaceous somewhat astringent taste. It renders boiling water very mucilaginous, and its decoction is blackened by the sulphate of iron.

Medical Properties and Uses. Loosestrife is demulcent and astringent; and may be advantageously given in diarrhœa and chronic dysentery after due preparation by evacuating treatment. It has long been used in Ireland in these complaints, and is said to be a popular remedy in Sweden. The dose of the powdered herb is about a drachm two or three times a day. A decoction of the root prepared by boiling an ounce in a pint of water may be given in the dose of two fluidounces. W.

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MAGNESIÆ CARBONAS. *U.S., Dub.*

Carbonate of Magnesia.

Off. Syn. MAGNESIÆ SUBCARBONAS. *Lond.;* CARBONAS MAGNESIÆ. *Ed.*

Carbonate de magnesie, *Fr.;* Kohlensaure Magnesia, *Germ.;* Carbonato di magnesia, *Ital.;* Carbonato de magnesia, *Span.*

Carbonate of magnesia sometimes though rarely occurs as a native mineral. That which is sold in the shops is prepared on a large scale by the manufacturer, and the article is therefore very properly placed in the list of Materia Medica of the United States Pharmacopœia. The British Colleges still retain it among the preparations, and direct it to be prepared by decomposing the sulphate of magnesia with carbonate of potassa. The Edinburgh and London Colleges use nine parts of the carbonate to twelve of the sulphate; and the Dublin College, seven parts to twelve. The *Edinburgh* process is as follows. The salts are separately dissolved in twice their weight of water, the clear solutions mixed, and eight times their weight of boiling water instantly added. The liquor is boiled a short time, with constant agitation, and the precipitated carbonate well washed and dried. The *London College* dissolves a pound of the sulphate in five pints of water, and nine ounces of the carbonate in three pints; two gallons of water are then added to the solution of the sulphate, the mixture is boiled, and the solution of the carbonate gradually added during the ebullition, the liquid being constantly stirred. The precipitate is repeatedly washed with boiling water, and dried with a heat of 200°. The *Dublin College* dissolves twenty-four parts of sulphate and fourteen parts of carbonate, each in two hundred parts of water, mixes the solutions, boils, filters, and washes the precipitate well with boiling water.

Although carbonate of potassa is thus ordered by all the Colleges, it is not as advantageously used as the carbonate of soda for the preparation of carbonate of magnesia. It is difficult to separate the last portions of sulphate of potassa from the precipitate, and the carbonate of potassa usually contains silica, which is thrown down with the magnesia. The consequence is, that when prepared by the officinal directions, the carbonate of magnesia is liable to be gritty to the touch and to have a saline taste. The following is said to be the method pursued by some of the best manufacturers. To a saturated solution of one hundred parts of sulphate of magnesia, a solution of one hundred and twenty-five parts of crystallized carbonate of soda is gradually added, the solutions being constantly stirred. The mixture is then heated to ebullition, to complete the precipitation of the magnesia, which is then washed with tepid and finally with cold water, until the washings no longer give a precipitate with the barytic salts. When it is sufficiently washed, the carbonate is allowed to drain for one or two days on large linen filters, and is then placed in wooden moulds with a porous bottom of brick or gypsum, and subjected to pressure in order to give it the square and compact form into which it is usually wrought.

The density of carbonate of magnesia is said to depend upon the strength of the solutions from which it is first precipitated, and its fineness and softness to the touch, upon the use of carbonate of soda in its preparation.

The principal part of the carbonate of magnesia used in this country is imported from Scotland. In the New England States it is prepared from the bittern of the salt works, which consists chiefly of sulphate and muriate of magnesia; and it is manufactured in Baltimore from the sulphate of magnesia prepared in that city. The Scotch magnesia is generally put up in cases of one hundred and twenty pounds each, the American in boxes containing fifty pounds.

We have spoken of the impurities which carbonate of magnesia prepared by the officinal process is apt to contain. When made from the bittern of the salt works, it is contaminated with carbonate of lime, salts of that earth being contained in sea-water; and when it is prepared from magnesite, or from magnesian schist, iron is almost always present. The only way in which these impurities can be avoided, is to prepare pure sulphate of magnesia by repeated crystallization, and to use a pure carbonate of soda. It is also necessary that the water with which the precipitate is washed should be free from earthy salts, which would be decomposed and contaminate the magnesia.

Berzelius takes the following view of the composition of this salt. When a current of carbonic acid is passed through water in which carbonate of magnesia is suspended, it is converted into a soluble bicarbonate. This salt cannot be obtained in a solid form; for if the solution is evaporated, one equivalent of the acid escapes with the water, and the carbonate crystallizes in small hexagonal prisms with plain summits. These crystals contain one equivalent of acid, one of base, and three of water. Cold water decomposes them, forming a soluble bicarbonate and an insoluble salt, containing less acid. Boiling water also decomposes them, and reduces them wholly to the state of the subsalt. The precipitate thus formed is the *magnesia alba* of the shops. It is a combination of three equivalents of carbonate of magnesia with one of hydrate of magnesia. These each contain an equivalent of water, and the composition of the salt may be thus stated;—three equivalents of carbonate (acid 66.36, magnesia 62.1, water 27,) = 155.46 + one equivalent of hydrate (magnesia 20.7, water 9,) = 29.7 = 185.16. This theoretic composition agrees very nearly with the analysis of Berzelius, who fixes it at 44.75 magnesia, 35.77 acid, and 19.48 water.

The composition of this salt varies with the mode of preparation. Thus Bucholz by decomposing the sulphate of magnesia with 170 per cent. of carbonate of soda, and using only cold water throughout, obtained a very light, spongy, somewhat coherent magnesia, containing 32 acid, 33 base, and 35 water. By using 120 per cent. of the carbonate, and boiling the water for fifteen minutes, he obtained a heavy granular precipitate containing 35 acid, 42 base, and 23 water.

Carbonate of magnesia is inodorous, nearly insipid, perfectly white, very light, smooth to the touch, and nearly insoluble in water, requiring 2493 parts of cold, and 9000 parts of hot water for solution. (*Turner's Chemistry.*) It is decomposed by a strong heat, by all the acids, by potassa, soda, lime, baryta, and strontia, by the sulphate, phosphate, nitrate, and muriate of alumina, and by acidulous and metallic salts.

A solution in carbonic acid water, prepared by passing carbonic acid gas into a reservoir containing the carbonate of magnesia suspended in water, has been introduced into use as a cathartic and antacid; but is in no respect preferable to the undissolved carbonate, while it is more unpleasant to the taste.

Medical Properties and Uses. The carbonate of magnesia is antacid, and by combining with acid in the stomach, becomes gently cathartic. When it undergoes no change in the alimentary canal, it produces no purgative effect. Under these circumstances, it may usually be made to operate by following it with draughts of lemonade. It is useful in all cases which require a laxative antacid; and though apt to produce flatulence in consequence of the extrication of its carbonic acid in the stomach and bowels, and therefore in ordinary cases inferior to the calcined magnesia, it sometimes operates favourably, in consequence of this very property, in sick stomach attended with acidity. The carbonate of magnesia is also an excellent antilithic in those cases in which uric acid is secreted in too great abundance.

The dose is from half a drachm to two drachms, which may be given suspended in water or milk. In order that it may be accurately diffused through water, it should be previously rubbed down with simple syrup or ginger syrup.*

Off. Prep. Magnesia, *U.S.*, *Lond. Ed.*, *Dub.* D. B. S.

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* *Dalby's Carminative* consists of carbonate of magnesia ℈ij; oil of peppermint ♏j, oil of nutmeg ♏ij, oil of aniseed ♏iij, tincture of castor ♏xxx, tincture of assafetida ♏xv, tincture of opium ♏v, spirit of pennyroyal ♏xv, compound tincture of cardamom ♏xxx, peppermint water f℥ij.

MAGNESIÆ SULPHAS. *U.S., Lond., Dub.*

Sulphate of Magnesia.

Off. Syn. SULPHAS MAGNESIÆ. *Ed.*

Epsom salt; Sulfate de magnésie, *Fr.;* Schwefelsaure Magnesia, *Germ.;* Solfato di magnesia, *Ital.;* Sulfato de magnesia, *Span.*

Sulphate of magnesia is one of the constituents of sea-water, and of some saline springs. It also occurs native, either crystallized in long, slender, prismatic, adhering crystals, or as an efflorescence on certain rocks and soils, which contain magnesia and a sulphate or sulphuret. In the United States it is found abundantly in the great caverns, so numerous to the west of the Alleghany mountains. In one of these caves, near Corydon in Indiana, it forms a stratum on the bottom several inches deep; or appears in masses sometimes weighing ten pounds; or is disseminated in the earth of the cavern, one bushel of which yields from four to twenty-five pounds of this sulphate. It also appears on the walls of the cavern, and if it be removed, acicular crystals again appear in a few weeks. (*Cleaveland.*)

The sulphate of magnesia was originally procured by evaporating the waters of some saline springs at Epsom in England. Dr. Grew prepared it in this manner in 1675. It was afterwards discovered that the brine remaining after the crystallization of common salt from sea-water, furnished by careful evaporation precisely the same salt; and as this was a much cheaper product it superseded the former. This residual brine or bittern consists of sulphate of magnesia and the muriates of magnesia and lime. As the sulphate of magnesia crystallizes first, it may with proper care be obtained nearly pure, although most frequently the salt prepared in this way is deliquescent, from being contaminated with the muriate of magnesia. It may be purified from this mixture by washing the crystals with its own saturated solution. It was from this source that the greater part of the Epsom salt of commerce was long obtained in Europe. The salt works of New England supplied our own markets with an impure and deliquescent sulphate. With the improvements in chemistry, other and better processes have latterly been adopted. In the neighbourhood of Genoa and of Nice, in Italy, sulphate of magnesia is prepared in large quantities from a schistose rock, which contains magnesia and sulphuret of iron. The mineral is roasted and exposed in heaps for some months to the combined action of air and water. It is then lixiviated, the sulphate of iron decomposed by lime-water, and the salt is obtained pure by repeated solution and crystallization.

William Henry of Manchester, whose calcined magnesia has become famous throughout the world, took out a patent for a mode of preparing magnesia and its salts from the double carbonate of magnesia and lime—the dolomite of mineralogists. His process was to drive off the carbonic acid by heat, and to convert the remaining earths into hydrates. He treated these with a sufficient quantity of muriatic acid to dissolve out the lime, and then converted the magnesia into a sulphate either by sulphuric acid or sulphate of iron.

Within a few years this salt has been extensively manufactured at Baltimore from the siliceous hydrate of magnesia, or magnesite. This mineral occurs in veins in the serpentine and other magnesian rocks which abound in the neighbourhood of that city, and in the southern counties of Pennsylvania. The advantage which it possesses over the dolomite, in the preparation of this salt, is the almost entire absence of lime, owing to which circumstance there is little or no waste of acid and the operation is much simplified. The mineral is reduced to a fine powder, and saturated with sulphuric acid. The mass is then dried and calcined at a red heat, in order to convert the sulphate of iron which may be present into red oxide. It is then dissolved in water, and sulphuret of lime added to separate any remaining portion of iron. The salt is crystallized and dissolved a third time, in order to purify it. The sulphate prepared at the Baltimore works by this process is generally very pure and clean, although it sometimes contains sulphate of iron.

Sulphate of magnesia is a colourless transparent salt, without smell, and of a bitter, nauseous, saline taste. It crystallizes in quadrangular prisms, terminating in a four-sided pyramid or in a dihedral summit. It usually occurs in small acicular crystals. It slowly effloresces in the air. At 32° of Fahrenheit, 100 parts of water dissolve 25.76 parts of the anhydrous salt, and for every increased degree of heat 0.8597 parts additional are taken up. The crystals contain 51.22 per cent. of water of crystallization, and dissolve in their own weight of water at 60°, and in three-fourths of their weight of boiling water; they melt in their water of crystallization, and at a high temperature fuse into an enamel. (*Berzelius.*) This salt consists of one equivalent of acid = 40.1, one of base = 20.7, and seven of water = 63; and its combining number is 123.8.

Sulphate of magnesia is completely decomposed by potassa, soda, and their carbonates; by lime, baryta, and strontia, and their soluble salts. Ammonia partially decomposes it, and forms with the remaining salt a double sulphate. The bicarbonates of potassa and soda do not decompose the sulphate of magnesia, except by the aid of heat.

Sulphate of magnesia is liable to contain iron and muriate of magnesia, the former of which may be detected by ferrocyanate of potassa, and the latter by its occasioning the salt to deliquesce. Sulphate of soda, made to crystallize in small needle-shaped crystals by constant stirring while it is cooling, was formerly substituted for this salt; but the fraud is no longer profitable, on account of the cheapness of the magnesian sulphate. The Baltimore works supply the whole United States with sulphate of magnesia.

Medical Properties and Uses. Sulphate of magnesia is a mild and safe cathartic, operating with little pain or nausea, and producing watery stools. It is more acceptable to the stomach than most medicines of its class, and will often be retained when others are rejected. Like many of the other neutral salts it is refrigerant, and may be made to act as a diuretic, by keeping the skin cool and walking about after it has been taken. It is well adapted to the treatment of fevers and inflammatory affections, especially after a previous thorough evacuation of the bowels by a more energetic cathartic. It is also useful in colic and obstinate constipation, and may be employed in most cases which require the use of a cathartic, without being attended with debility or relaxation of the stomach and bowels. The medium dose is an ounce; but advantage often results from its administration in divided doses frequently repeated. It is frequently given in combination with other medicines, especially with senna, the griping effect of which it tends to obviate. The pleasantest form for administering the salt, and that in which it usually agrees best with the stomach, is a solution in carbonic acid water with lemon syrup. By Dr. Henry of Dublin it is highly recommended in connexion with sulphuric acid. To seven ounces of the saturated aqueous solution of the salt he adds an ounce of the diluted sulphuric acid of the Pharmacopœias, and gives a tablespoonful of the mixture for a dose, in a wineglassful of water.

Off. Prep. Enema Catharticum, *Dub.;* Magnesiæ Carbonas, *Lond., Ed., Dub.;* Magnesiæ Sulphas Purum, *Dub.;* Pulvis Salinus Compositus, *Ed., Dub.*

D. B. S.

MAGNOLIA. *U.S. Secondary.*

Magnolia.

"Magnolia glauca, Magnolia acuminata, et Magnolia tripetala. Cortex. *The bark.*" *U.S.*

Magnolia. *Sex. Syst.* Polyandria Polygynia.—*Nat. Ord.* Magnoliaceæ.

Gen. Ch. Calyx three-leaved. *Petals* six or more. *Capsules* two-valved, one-seeded, imbricated in a cone. *Seeds* berried, pendulous. *Bigelow.*

The medicinal properties which have rendered the bark of the Magnolia officinal, are common to most, if not all of the species composing this splendid genus. Among the numerous trees which adorn the American landscape, these are most conspicuous for the beautiful richness of their foliage, and the magnificence as well as delicious odour of their flowers; and the *M. grandiflora* of the Southern States rivals in magnitude the largest inhabitants of our forests. The Pharmacopœia designates the *M. glauca*, *M. acuminata*, and *M. tripetala*, each of which we shall briefly describe.

1. *Magnolia glauca.* Willd. *Sp. Plant.* ii. 1256; Bigelow, *Am. Med. Bot.* ii. 67; Barton, *Med. Bot.* i. 77; Michaux, *N. Am. Sylv.* ii. 8. This species of Magnolia, which in the Northern States is often nothing more than a shrub, sometimes attains in the South the height of forty feet. The leaves are scattered, petiolate, oval, obtuse, entire, glabrous, thick, opaque, yellowish-green on their upper surface, and of a beautiful pale glaucous colour beneath. The flowers are large, terminal, solitary, cream-coloured, strongly and gratefully odorous, often scenting the air to a considerable distance. The calyx is composed of three leaves; the petals, from eight to fourteen in number, are obovate, obtuse, concave, and contracted at the base; the stamens are very numerous, and inserted on a conical receptacle; the germs are collected into a cone, and each is surmounted by a linear recurved style. The fruit is conical, about an inch in length, consisting of numerous imbricated cells, each containing a single scarlet seed. This escapes through a longitudinal opening in the cell, but remains for some time suspended from the cone by a slender thread to which it is attached.

The M. glauca extends along the seaboard of the United States, from Cape Ann in Massachusetts to the shores of the Gulf of Mexico. It is abundant in the Middle and Southern States, usually growing in swamps and morasses; and is seldom met with in the interior of the country west of the mountains. It begins to flower in May, June, or July, according to the latitude. It is known by the name of *magnolia* simply in the Northern and Middle States; by that of *white bay* or *sweet bay* in the South, and is occasionly called *swamp sassafras, beaver tree, &c.*

2. *M. acuminata.* Willd. *Sp. Plant.* ii. 1257; Michaux, *N. Am. Sylv.* ii. 12. This species is much larger than the preceding, often growing to the height of seventy or eighty feet. The leaves are six or seven inches long, by three or four in breadth, oval, acuminate, and pubescent on their

under surface. The flowers are five or six inches in diameter, bluish or cream-coloured, slightly odorous, with obovate rather obtuse petals from six to nine in number. Mingled with the splendid foliage, they give a magnificent aspect to the tree when large and in full bloom. The tree grows in the mountainous regions in the interior of the United States, extending along the Alleghanies from the state of New York to their termination in Georgia, and seldom existing in the low country far either to the east or the west of this range. Wherever it is found, it is called *cucumber tree*, from the resemblance of its fruit in shape and size to this product of the gardens.

3. *M. tripetala.* Willd. *Sp. Plant.* ii. 1258; Michaux, *N. Am. Sylv.* ii. 18. This is a small tree, sometimes though rarely reaching an elevation of thirty feet, and almost always having an inclined trunk. It is remarkable for the size of its leaves and flowers. The former are eighteen or twenty inches long, by seven or eight in breadth, thin, obovate, somewhat wedge-shaped, entire, acute at both extremities, pubescent when young, and often disposed in rays at the extremity of the shoots, displaying a surface thirty inches in diameter. Hence has arisen the name of *umbrella tree*, by which this species is distinguished. The flowers are terminal, seven or eight inches in diameter, white, with from five to twelve oval acute petals, of which the three outer are reflexed. This species extends from the northern parts of New York to the southern limits of the United States. It is found only in situations which are shady, with a strong, deep, and fertile soil. It is common in some of the islands of the Susquehanna, and still more so in the Southern and South Western States. *Michaux.*

The bark and fruit of all the species of Magnolia are possessed of similar medicinal properties; but the bark only is officinal; and that of the root is thought to be most efficient. It has an aromatic odour, and a bitter, pungent, spicy taste. The aromatic property, which resides in a volatile principle, is diminished by desiccation, and entirely lost when the bark is long kept. The bitterness, however, remains. The bark is destitute of astringency.

Medical Properties and Uses. Magnolia is a gently stimulant aromatic tonic and diaphoretic, useful in chronic rheumatism, and capable, if freely given, of arresting the paroxysms of intermittent fever. It has been used advantageously in these complaints, and in remittents, especially of a typhoid character. The dose of the recently dried bark in powder is from half a drachm to a drachm, frequently repeated. The infusion may also be used, but is less efficient. Diluted alcohol extracts all the virtues of the medicine; and a tincture made by macerating the fresh bark or cones in brandy, is a popular remedy in chronic rheumatism. W.

MALVA. *Lond.*

Mallows.

"Malva sylvestris." *Lond.*

Off. Syn. MALVÆ SYLVESTRIS HERBA. MALVÆ SYLVESTRIS FLORES. *Ed.*

Mauve sauvage, *Fr.;* Waldmalve, *Germ.;* Malva, *Ital., Span.*

Malva. *Sex. Syst.* Monadelphia Polyandria.—*Nat. Ord.* Malvaceæ.

Gen. Ch. Calyx double, the exterior three-leaved. *Capsules* very many, one-seeded. *Willd.*

Malva sylvestris. Willd. *Sp. Plant.* iii. 787; Woodv. *Med. Bot.* p. 554. t. 197. This is a perennial, herbaceous plant, with a round, hairy, branching, usually erect stem, from one to three feet high, bearing alternate, petiolate, cordate, roughish leaves, which are divided into five or seven crenate lobes, and on the upper part of the stem are almost palmate. The flowers are large, purplish, and placed from three to five together at the axils of the leaves, upon long slender peduncles, which, as well as the petioles, are pubescent. The petals are five in number, inversely cordate, and three times as long as the calyx. The capsules are disposed compactly in a circular form.

This species of mallow is a native of Europe, where it grows abundantly on waste grounds and by the way-sides, flowering from May to August. It is sometimes cultivated in our gardens. Other species, indigenous or naturalized in this country, are possessed of the same properties, which are in fact common to the whole genus. The *M. rotundifolia* is one of the most common, and may be substituted for the *sylvestris* without disadvantage.

The herb and flowers, which are the officinal parts, have a weak, herbaceous, slimy taste, without any odour. They abound in mucilage, which they readily impart to water; and the solution is precipitated by acetate of lead. The infusion and tincture of the flowers are blue, and serve as an excellent test of acids and alkalies, being reddened by the former, and rendered green by the latter. The roots and seeds are also mucilaginous, but are less used.

Medical Properties and Uses. Mallows are emollient and demulcent. The infusion and decoction are sometimes employed in catarrhal, dysenteric, and nephritic complaints; and are applicable to all other cases which call for the use of mucilaginous liquids. They are also used as an emollient injection; and the fresh plant forms a good suppurative or relaxing cataplasm in external inflammation. Mallows were formerly among the culinary herbs.

W.

MANGANESII OXYDUM. *Dub.*

Oxide of Manganese.

Manganese, Black oxide of manganese; Oxide noir de manganese, *Fr.;* Braunstein, *Germ.;* Manganese, *Ital., Span.*

Of the Pharmacopœias noticed in this work, black oxide of manganese is officinal only in that of the Dublin College. It is the peroxide of a peculiar metal properly called manganese; though this name is commonly applied to the oxide under consideration. *Metallic manganese* was discovered by Scheele and Gahn in 1774, and is obtained from the native black oxide by intense ignition with charcoal. It is hard, brittle, granular, of a grayish-white colour, and emits a disagreeable odour in a moist atmosphere. It oxidizes readily by the action of the air, first tarnishing, then assuming a yellowish or violet colour, and finally becoming converted into a black powder. Its sp. gr. is 8, melting point 160° of Wedgwood, and equivalent number 27.7. With oxygen it forms five combinations, three regular oxides and two acids. The *protoxide* is of a light green colour, and is the oxide present in the salts of manganese. The *sesquioxide* is black or dark brown, and the *peroxide* black. The two acids are formed by the action of potassa on the peroxide, and are called *manganic* and *permanganic acid.* Assuming one equiv. of manganese in each of these combinations, the protoxide is found to contain one, the sesquioxide one and a half,* the peroxide two, manganic acid three, and permanganic acid three and a half equivalents of oxygen. (*Berzelius.*) Besides these, there exist a double oxide, of a brownish-red colour, called the *red oxide*, consisting of one equiv. of protoxide and one of sesquioxide, and invariably formed when any one of the other oxides of manganese is exposed to a white heat; and a native oxide, called *Varvicite*, composed of two equiv. of peroxide, and one of sesquioxide. Metallic manganese is an occasional constituent of organic matter. It was detected in minute quantity in bones by Fourcroy and Vauquelin, and is often present in the ashes of plants. In the mineral kingdom, it occurs sometimes as a sulphuret, rarely as a phosphate, but very abundantly as the black or peroxide. It is this latter mineral which constitutes the officinal oxide of the Dublin College.

Properties. Peroxide of manganese, as it occurs in nature, is very variable in its appearance. It is found sometimes in brilliant needle-shaped crystals, often in compact masses having the metallic lustre, but far more frequently in the form of a dull earthy looking substance of a black or brown colour. When crystallized it is the purest. As it occurs in commerce it is usually in the form of powder, of a black colour, insoluble in water, and containing as impurities more or less oxide of iron, carbonate of lime, and argillaceous matter. When exposed to a red heat it yields a considerable quantity of oxygen, and is reduced to the state of sesquioxide. It is distinguished from the sulphuret of antimony by its infusibility, and by its causing the evolution of chlorine on the addition of muriatic acid. When of a brown colour, it is not of good quality. Its composition has been given above.

But few mines of peroxide of manganese exist, though the metal itself is very generally diffused throughout the mineral kingdom. It occurs most abundantly in Bohemia, Saxony, the Hartz, France, and Great Britain. In England the most abundant mine is that of Upton Pine, near Exeter, which furnishes the best oxide of manganese found in Great Britain. In the United States no mines have been opened, except in Vermont, from which state an inferior brown ferruginous manganese is supplied through Boston. Besides this source of supply, the mineral is received from Nova Scotia, France, Germany, England, and occasionally Scotland. It comes packed in casks or barrels, generally in lumps and coarse powder, just as it is dug out of the mines; though occasionally it is received from England ready pulverized. It is a good general rule to buy it unpowdered, as its quality can be better judged of in that state. A dark shining crystalline appearance may be taken as an indication of good quality. The Nova Scotia manganese is better than the Vermont; but that received from Germany and England is the best, and commands the highest price in the market. The Scotch manganese, which has only been latterly received in this country, is of good quality.

Medical Properties and Uses. The therapeutic effects of this oxide have not been regularly investigated. The only notice we have seen of its medical use is its employment in the form of ointment, in the proportion of one or two drachms to the ounce of lard, for the cure of porrigo, in which disease it is said to succeed well.

Peroxide of manganese is used in the arts for obtaining chlorine for the purpose of bleaching, to give a black glazing to pottery, and for freeing glass from the colour which it derives from the peroxide of iron. According to Berzelius, a few pounds of it added to each cask of water intended for sea-voyages, will preserve it sweet. In the laboratory, it is employed to obtain oxygen and chlorine, and to form the salts of manganese. The only use made of it by the Dublin College is to procure the aqueous solution of chlorine. (See *Aqua Chlorinii.*) B.

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* In order to avoid fractional equivalents, the sesquioxide is supposed to consist of two equiv. of metal, and three of oxygen, which is the same proportion and given in the text.

MANNA. *U.S., Lond., Ed., Dub.*

Manna.

"Fraxinus ornus. Succus concretus. *The concrete juice.*" *U. S.*

Manne, *Fr.;* Manna, *Germ., Ital.;* Mana, *Span.*

Manna is not the product of one plant exclusively. Besides the *Fraxinus Ornus* indicated by the Pharmacopœias, it is afforded by several other species of the same genus, among which the *F. rotundifolia*, *F. excelsior*, and *F. parviflora* are particularly mentioned. Burkhardt states that a species of manna, which exudes from the tamarisk of the North of Africa, is used by the Bedouin Arabs of the neighbourhood of Mount Sanai with their food. It is, however, chemically different from common manna, as, according to M. Mitscherlich, it contains no mannite, but consists wholly of mucilaginous sugar. Dr. Ehrenbergh found the tree which produces it to be a variety of the Tamarix Gallica. The manna used in India is said to be the product of the *Hedysarum Alhagi* of Linn., the *Alhagi Maurorum* of De Candolle, a thorny shrub, which grows abundantly in the deserts of Persia and Arabia. It is, however, much inferior to that obtained from the different species of ash. We are told by Dr. Richardson, that a substance exactly resembling manna, is procured by exudation from a species of *Eucalyptus* called the *E. manifera*, growing in New South Wales. The substance known, in France, by the name of *Briançon Manna*, is an exudation upon the surface of the common European larch—*Pinus Larix* or *Larix Europæa*—and differs chemically from the product of the Fraxinus, in containing no mannite.

Fraxinus. *Sex. Syst.* Polygamia Diœcia.—*Nat. Ord.* Jasmineæ, *Juss.;* Oleaceæ, *Lindley.*

Gen. Ch. Hermaphrodite. *Calyx* none, or four-parted. *Corolla* none, or four-petaled. *Stamens* two. *Pistil* one. *Samarra* one-seeded, terminated by a lanceolate wing. Female. *Calyx* none, or four-parted. *Corolla* none, or four-petaled. *Pistil* one. *Samarra* one-seeded, terminated by a lanceolate wing. *Willd.*

Fraxinus Ornus. Willd. *Sp. Plant.* iv. 1104; Woodv. *Med. Bot.* p. 589. t. 209. The *flowering ash* is a tree of moderate height, usually from twenty to twenty-five feet, very branching, with opposite, petiolate, pinnate leaves, composed of three or four pairs of leaflets, and an odd one at the extremity. The leaflets are oval, acuminate, obtusely serrate, about an inch and a half in length, smooth, of a bright green colour, and stand on short footstalks. The flowers are white, and usually expand at the same time with the leaves. They grow in close panicles at the extremity of the young branches, and have a very short calyx with four teeth, and a corolla composed of four linear lanceolate petals.

Both this species of Fraxinus, and the *F. rotundifolia*, are natives of Sicily, Calabria, and Apulia; and both contribute to supply the manna of commerce. During the hot months, the juice exudes spontaneously from the bark, and concretes upon its surface; but as the exudation is slow, it is customary to facilitate the process by making deep longitudinal incisions on one side of the trunk. In the following season these are repeated on the other side, and thus alternately for thirty or forty years, during which the trees are said to yield manna. Straws or clean chips are frequently placed so as to receive the juice, which concretes upon them. The manna varies much in its character, according to the mode of collection and nature of the season, and the period of the year in which the exudation takes place. That procured in Sicily is said to be the best. Three varieties are distinguishable in commerce.

1. The purest is that usually known by the name of *flake manna.* It exudes spontaneously or by incisions during the hottest and dryest weather in the months of July and August. It is in irregular, unequal pieces, somewhat similar in appearance to stalactites, rough, light, porous, brittle, of a whitish or yellowish-white colour, and frequently concave on the surface by which they were attached to the trunk, and which is often soiled by impurities, sometimes by adherent fragments of the bark. When broken, these pieces present a crystalline or granular structure.

2. *Common manna—manne en sorte* of French Pharmacy—is next in quality, and is collected in September and the beginning of October, when the heat of the weather has begun to moderate. The juice does not now concrete so readily, and a portion, falling on the ground at the root of the tree, becomes more or less mixed with impurities, and forms imperfectly solid masses, which require to be further dried in the sun. The common manna consists of whitish or yellowish fragments similar to the pieces of flake manna, but much smaller, mixed with a soft, viscid, uncrystallized, brownish mass, identical with that which constitutes the following variety.

3. *Fat manna* is collected in the latter part of October and November, when the weather is cooler and rains more common. The juice is now still less disposed to concrete, and flowing down the trunk is received in a small excavation at its base. As found in commerce it is in the form of a soft, viscous mass, containing few crystalline fragments, of a brown or yellowish-brown colour, and full of impurities.

Manna may be found in the shops of every grade, from the most impure of the third variety to the purest of the first.

Attempts have sometimes been made to counterfeit it; but the facility of detection renders frauds of this kind unprofitable, and they are not often practised.

Properties. Manna has a slight, peculiar odour, and a sweet taste, which in the impure kinds is also very nauseous, but in the finest flake manna, scarcely so much so as to be disagreeable. It melts with heat, and takes fire, burning with a blue flame. When pure it is soluble in three parts of cold, and in its own weight of boiling water. From a boiling saturated aqueous solution, it separates in partially crystalline masses. Alcohol also dissolves it, and if saturated by means of heat, deposites upon cooling a large proportion of the manna in a beautifully crystalline form. Analyzed by Fourcroy and Vauquelin, manna was found to consist of, 1. a peculiar crystallizable saccharine principle, called *mannite,* which constitutes seventy-five per cent.; 2. true sugar; 3. a yellow nauseous matter, upon which the purgative property chiefly depends; and 4. a small quantity of mucilage. It is owing to the presence of true sugar that manna is capable of fermenting. *Mannite* is white, inodorous, crystallizable in semi-transparent needles, of a sweetish taste, soluble in five parts of cold water, scarcely soluble in cold alcohol, but readily dissolved by that liquid when hot, and precipitated when it cools. Unlike sugar, it is incapable of undergoing the vinous fermentation. It may be obtained by boiling manna in alcohol, allowing the solution to cool, and redissolving the crystalline precipitate. It is the pure mannite which is now thrown down. This principle has been found in numerous vegetables. It is said to act as a gentle laxative, in the dose of one or two ounces.

Manna, when long kept, acquires a deeper colour, softens, and ferments. That which is dryest resists this change the longest. We are told that when recently gathered it is less purgative than it afterwards becomes.

Medical Properties and Uses. Manna is a gentle laxative, usually operating pleasantly, but in some cases, producing flatulence and pain. Though peculiarly adapted to children and pregnant women, it may be given with advantage in ordinary cases of piles from constipation, unattended with dyspeptic symptoms. It is usually, however, prescribed with other purgatives, particularly senna, rhubarb, magnesia, and the neutral salts, the taste of which it conceals, while it adds to the purgative effect.

The dose for an adult is from one to two ounces; for children, from one to four drachms. It is usually given dissolved in water or some aromatic infusion; but the best flake manna may be conveniently administered in substance.

Off. Prep. Confectio Cassiæ, *Lond.*, *Ed.*, *Dub.;* Enema Catharticum, *Dub.;* Syrupus Sennæ, *Lond.* W.

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MARANTA. *U.S.*

Arrow-root.

"Maranta arundinacea. Radicis fæcula. *The fecula of the root.*" *U.S.*

Arrow-root, *Fr.;* Amerikanisches Stärkmehl, Arrowmehl, *Germ.*

Maranta. *Sex. Syst.* Monandria Monogynia.—*Nat. Ord.* Cannæ, *Juss.;* Marantaceæ, *Lindley.*

Gen. Ch. *Anther* attached to the petal-like filament. *Style* petal-shaped. *Stigma* three-sided. *Flowers* panicled. *Loudon's Encyc.*

Maranta arundinacea. Willd. *Sp. Plant.* i. 13; *Loudon's Encyc. of Plants*, p. 2. The root of this plant is perennial, tuberous, fleshy, horizontal, nearly cylindrical, scaly, from six inches to a foot or more in length, and furnished with numerous long, white fibres. The stems, of which several rise from the same root, are annual, slender, branched, jointed, leafy, and about three feet in height. The leaves are ovate lanceolate, about four inches long, alternate, and supported solitarily at the joints of the stem upon long, sheathing footstalks. The flowers are in a long, loose, spreading, terminal panicle, at each ramification of which is a solitary linear bracte. The calyx consists of three small lanceolate leaves. The corolla is white and monopetalous, with a tube longer than the calyx, and a double border, of which the three outermost segments are smallest, and the two inner obovate, and slightly emarginate.

The arrow-root plant is a native of South America and of the West Indies, where it is largely cultivated. It grows also in Florida, and has been cultivated in our Southern States, but not very extensively, as we still derive our supplies of its product from abroad. The plant is easily propagated by cuttings of the root. In the West Indies, the fecula, so well known by the name of arrow-root, is prepared in the following manner. The roots are dug up when a year old, washed, and then beat into a pulp, which is thrown into water, and agitated so as to separate the amylaceous from the fibrous portion. The fibres are removed by the hand, and the starch remains suspended in the water, to which it gives a milky colour. This milky fluid is strained through coarse linen, and allowed to stand that the fecula may subside, which is then washed with a fresh portion of water, and afterwards dried in the sun. We obtain arrow-root chiefly from the West Indies, and the ports of Brazil.

It is probable that other plants contribute to furnish the arrow-root of commerce. Lindley states that it is procured in the West Indies from the *Maranta Allouya* and *M. nobilis*, besides the *M. arundinacea*. Under the name of *M. Indica*, Tussac describes a distinct species which he says was originally brought from the East Indies, and is now cultivated in Jamaica. This species, however, is not admitted by any of the British botanists whom we have consulted. Very fine arrow-root is obtained in the East Indies from the root of the *Curcuma angustifolia* of Roxburgh, which is abundantly cultivated in Travancore. Parcels have occasionally reached this country; but from the length of the voyage are apt to be more or less musty. The East India arrow-root is lighter than ours, and does not so quickly make a jelly. Ainslie informs us that the *M. arundinacea* has lately been introduced from the West Indies into Ceylon, where good arrow-root is prepared from it. A fecula closely resembling that of the Maranta, is said by Guibourt to be prepared in the West Indies from the root of the cassava plant, *Jatropha Manihot;* and it is not improbable that a portion of the arrow-root brought to the United States has a similar origin. In fact, that imported from South America often contains small lumps, as large as a pin's head, identical with tapioca, which is a product of the *J. Manihot*. Arrow-root has recently been advertised as coming from the Sandwich Islands. It is probably identical with that said to be procured from the root of the *Tacca pinnatifida*, which grows abundantly in Tahiti and other islands of the South Pacific.

Arrow-root is in the form of a light white powder, or of small pulverulent masses, without smell or taste. It is a pure starch, identical in chemical properties with that of wheat and the potato. It is very apt to be musty, and should then be rejected. It is said to be sometimes adulterated with common starch, and with that of the potato. There is no certain mode of detecting these, unless the microscope may afford the means. (See *Amylum.*) The odour and taste are the best criteria of its purity. It should be perfectly free from smell and unpleasant flavour.

Attempts have been made to substitute finely prepared potato starch for arrow-root; and there is no doubt that, medically considered, it is quite equal; but patients complain of an unpleasant taste of the potato which it is apt to retain.

Medical Properties and Uses. Arrow-root is nutritious and demulcent, affording a light, very mild, and easily digested article of diet, well adapted for the sick and convalescent, and peculiarly suited, from its demulcent properties to bowel complaints and diseases of the urinary passages. It is much used as food for infants after weaning, or when the mother's milk is insufficient. It is prepared by dissolving it in hot water, with which it forms a pearly gelatinous solution, and, if in sufficient quantity, a jelly-like mass on cooling. A table-spoonful will communicate sufficient consistence to a pint of water. It should first be formed into a paste with a small quantity of cold water, and the boiling water then gradually added with brisk agitation. The preparation may be rendered more palatable by the addition of lemon-juice and sugar, or in low forms of disease by that of wine and spices, if the latter are not contraindicated. For children the arrow-root is usually prepared with milk. W.

MARRUBIUM. *U.S. Secondary.*

Horehound.

"Marrubium vulgare. Herba. *The herb.*" *U.S.*

Off. Syn. MARRUBIUM. Marrubium vulgare. *Lond.;* MARRUBII VULGARIS HERBA. *Ed.;* MARRUBIUM VULGARE. *Dub.*

Marrube blanc, *Fr.;* Weisser Andorn, *Germ.;* Marrubio, *Ital., Spa n.*

Marrubium. *Sex. Syst.* Didynamia Gymnospermia.—*Nat. Ord.* Labiatæ.

Gen. Ch. *Calyx* salver-shaped, rigid, ten-streaked. *Corolla* with the upper lip bifid, linear, and straight.

Marrubium vulgare. Willd. *Sp. Plant.* iii. 111; Woodv. *Med. Bot.* p. 332. t. 118. The *white horehound* has a perennial fibrous root, and numerous annual stems, which are quadrangular, erect, very downy, and from twelve to eighteen inches high. The leaves are roundish ovate, dentate or deeply serrate, wrinkled, veined, hoary on the under surface, and supported in pairs upon strong footstalks. The flowers are white, and disposed in crowded axillary whorls. The calyx is tubular, and divided at the margin into ten narrow segments which are hooked at the end. The corolla is also tubular, with a labiate margin, of which the upper lip is bifid, the under reflected and three-cleft, with the middle segment broad and slightly scolloped. The seeds are four, and lie in the bottom of the calyx.

This plant is a native of Europe, but has been naturalized in this country, where it grows on the roadsides, and flowers in July and August. It is also cultivated in our gardens.

The herb has a strong rather agreeable odour, which is diminished by drying, and is lost by keeping. Its taste is bitter and durable. The bitterness is extracted by water and alcohol.

Medical Properties and Uses. Horehound is tonic, in large doses laxative, and may be so given as to increase the secretion from the skin, and occasionally from the kidneys. It was formerly considered a valuable deobstruent, and recommended in chronic hepatitis, jaundice, menstrual obstructions, phthisis, and various cachectic affections. By its gently tonic powers it may undoubtedly have proved advantageous in some of these complaints; but it exerts no specific influence over any; and has now passed almost entirely from the hands of physicians into domestic use. It is employed chiefly in catarrh, and other chronic affections of the lungs attended with cough and copious expectoration. The infusion made in the proportion of an ounce of the herb to a pint of boiling water, may be given in wineglassful doses. The dose of the powder is from thirty grains to a drachm. The medicine is also much used in the shape of syrup and candy.

W.

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MASTICHE. *Lond.*

Mastich.

"Pistacia Lentiscus. *Resina.*" *Lond.*

Off. Syn. PISTACIÆ LENTISCI RESINA. *Ed.;* MASTICHE. PISTACIA LENTISCUS. Resina. *Dub.*

Mastic, *Fr.;* Mastix, *Germ.;* Mastice, *Ital.;* Almastiga, *Span.;* Sakes, *Turk.;* Arab, *Arab.*

Pistacia. *Sex. Syst.* Diœcia Pentandria.—*Nat. Ord.* Terebintaceæ, *Juss.;* Anacardiaceæ, *Lindley.*

Gen. Ch. Male. *Calyx* five-cleft. *Corolla* none. Female. *Calyx* three-cleft. *Corolla* none. *Styles* three. *Drupe* one-seeded. *Willd.*

Pistacia Lentiscus. Willd. *Sp. Plant.* iv. 753; Woodv. *Med. Bot.* p. 26. t. 11. The *lentisk* is a shrub or small tree, seldom rising more than twelve feet in height, much branched towards the top, and furnished with petiolate, abruptly pinnate leaves. The leaflets are from eight to twelve in number, usually alternate, with the exception of the two upper which are opposite. They are ovate lanceolate, entire, obtuse, often mucronate, and sessile upon the common footstalk, which is winged, or furnished with a narrow foliaceous expansion on each side. The flowers are diœcious, and very small. The male are in an axillary ament; the female are arranged alternately upon a common peduncle, which is also axillary.

This tree is a native of the countries which border upon the Mediterranean; but does not yield mastich in all places. The island of Scio in the Grecian Archipelago is the place whence the drug is chiefly obtained. Incisions are made in the trunk and principal branches, from which the juice slowly exudes, and either hardens in tears upon the bark, or drops on the ground, where it is sometimes received upon cloths spread for the purpose, sometimes upon the bare earth, and concretes in irregular masses. The tears are most highly valued.

They are of various sizes, oval or roundish, often compressed, smooth, semi-transparent, of a pale yellow colour, of a shining fracture, friable, and usually covered with a whitish powder, occasioned by their friction against each other. The masses are composed of yellowish tears agglutinated together, with others of a darker colour and less translucent, and often fragments of wood, bark, or earthy matter intermingled.

Mastich is nearly inodorous, unless rubbed or heated, when it becomes fragrant. Its taste is weak but agreeably terebinthinate, and, after long chewing, very slightly acrid. It is at first friable under the teeth, but soon becomes soft and ductile, and acquires a white opaque appearance. Its sp. gr. is 1.074. It is fusible and inflammable by heat. Alcohol dissolves about four-fifths of it, leaving a viscid substance which becomes brittle when dried, and for which the name of *masticin* has been proposed. This substance, though not dissolved by alcohol, softens and swells up in it, as gluten does in water. According to Berzelius, it enjoys the same general properties as copal, and should be considered as a variety of resin. Mastich is wholly soluble in ether and in oil of turpentine, scarcely soluble in the fixed oils, and insoluble in water. It consists chiefly of resin, with *masticin*, and a minute proportion of volatile oil, which can scarcely be said to have been obtained in a separate state, though it imparts flavour to alcohol and water distilled from the mastich, especially when this has been previously triturated with an equal weight of carbonate of potassa.

Medical Properties and Uses. Mastich was formerly thought to possess properties analogous to those of the turpentines, and was used in debility of the stomach, hæmoptysis from ulceration, leucorrhœa, chronic diarrhœa, &c.; but its virtues were overrated; and it is at present scarcely ever given internally. It is sometimes employed to fill the cavities of carious teeth, for which purpose it is well fitted by its softness. Great quantities of it are consumed in Turkey, where it is habitually chewed by the women, under the impression that it sweetens the breath and preserves the gums and teeth. Dissolved in alcohol or oil of turpentine, it serves for the formation of a brilliant varnish.

The following mode of applying it to carious teeth is highly recommended. Dissolve four parts of mastich in one part of sulphuric ether, in a bottle well stopped. With the solution thus formed, which is of a yellow colour and oily consistence, saturate a small piece of cotton of the size of the carious cavity, and having well cleansed and dried the cavity, introduce the cotton, without painful pressure, so as to fill it exactly. The ether is soon evaporated, and the resin, remaining soft and adhesive, attaches itself to the diseased surface of the tooth, which it protects from the action of the air, and of the food taken into the mouth. (*Journ. de Pharm.* xx. 597.) W.

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MEL. *U.S., Lond., Ed., Dub.*

Honey.

Miel, *Fr.;* Honig, *Germ.;* Miele, *Ital.;* Miel, *Span.*

Naturalists have not yet determined whether honey is a secretion of the bee, *Apis mellifica*, or whether it exists already formed in plants. It is certain that the nectaries of flowers contain a saccharine matter, which is extracted by the insect; and the fact is well known that the flavour and character of honey are very much affected by the nature of the plants which predominate in the vicinity of the hive; so much so, that when these plants are poisonous, the fluid sometimes partakes of their noxious qualities. Still, it probably undergoes some change in the organs of the bee; as the saccharine matter of the nectaries, so far as it has been possible to examine it, wants some of the characteristic properties of honey.

The finest honey is that which is allowed to drain from the comb. If obtained from hives which have never swarmed, it is called *virgin honey*. An inferior kind is procured by exposing the comb to pressure, and if heat be employed previously to expression, the product is still more impure.

Much honey is collected in different parts of the United States; but that with which the shops of cities on the seaboard are supplied, is derived chiefly from Cuba.

In the recent state honey is fluid; but on being kept, it forms a crystalline deposite, and is ultimately converted into a soft granular mass. In the shops it is found of every consistence, from that of a viscid liquid like thin syrup or oil, to that of lard or soft suet. Its colour is sometimes white, but usually yellowish, and occasionally of a brown or reddish tinge. It has a peculiar agreeable odour, varying somewhat with the flowers from which it was collected, and a very sweet feebly aromatic taste, which is followed by a slight prickling or sense of acrimony in the fauces. Its specific gravity is about 1.333. (*Duncan.*) Cold water dissolves it readily, alcohol with less facility. It contains crystallizable sugar analogous to that of the cane, uncrystallizable sugar, an aromatic principle, an acid, wax, and, according to Guibourt, a small quantity of mannite. The crystalline sugar may be obtained by treating granular honey with a small quantity of alcohol, which when expressed takes along with it the other ingredients, leaving the crystals nearly untouched. The same end may be attained by melting the honey, saturating its acid with carbonate of lime, filtering the liquid, then setting it aside to crystallize, and washing the crystals with alcohol. Inferior honey usually contains a larger proportion of uncrystallizable sugar and vegetable acid. Diluted with water, honey undergoes the vinous fermentation; and treated with nitric acid, is converted into oxalic acid.

In warm weather, honey, if not very pure, sometimes ferments, acquiring a pungent taste, and a deeper colour. Starch is said to be occasionally added to the inferior kinds to give them a white appearance. The adulteration may be detected by dilution with water, which dissolves the honey and leaves the starch at the bottom of the vessel. The nature of the deposite may be tested by the tincture of iodine. Water is said to be sometimes added to honey to increase its bulk. Its presence may be suspected from the greater thinness of the liquid, and its want of disposition to crystallize.

Medical Properties and Uses. Honey possesses the same medical properties with sugar, but is more disposed to run off by the bowels, and to occasion griping pain. Though largely consumed as an article of food, it is seldom employed medicinally, except as the vehicle of more active substances. Its taste and detergent qualities render it a useful addition to gargles, and it is sometimes employed as an application to foul ulcers, and in the form of enema.

Off. Prep. Confectio Piperis Nigri, *Lond.*, *Dub.;* Confectio Rutæ *Lond.*, *Dub.;* Mel Boracis, *Lond.*, *Ed.*, *Dub.;* Mel Despumatum, *U. S.*, *Lond.*, *Ed.*, *Dub.;* Mel Rosæ, *Lond.*, *Dub.*, *Ed.;* Mel Scillæ Compositum, *U. S.;* Oxymel Simplex, *Lond.*, *Ed.*, *Dub.;* Oxymel Colchici, *Dub.;* Oxymel Scillæ, *U. S.*, *Lond.*, *Dub.;* Oxymel Cupri Subacetatis, *Dub.* W.

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MELISSA OFFICINALIS. Herba. *Dub.*

Balm.

Off. Syn. MELISSÆ OFFICINALIS FOLIA. *Ed.*

Melisse, *Fr.;* Garten-Melisse, *Germ.;* Melissa, *Ital.;* Torongil, *Span.*

Melissa. *Sex. Syst.* Didynamia Gymnospermia.—*Nat. Ord.* Labiatæ.

Gen. Ch. Calyx dry, nearly flat above; with the upper lip sub-fastigiate. *Corolla,* upper lip somewhat arched, bifid; lower lip with the middle lobe cordate. *Willd.*

Melissa officinalis. Willd. *Sp. Plant.* iii. 146; Woodv. *Med. Bot.* p. 334. t. 119. Balm has a perennial root, which sends up annually several erect, quadrangular stems, usually branched towards the base, and a foot or two in height. The leaves are opposite, ovate or cordate, deeply serrate, pubescent; the lower on long footstalks, the uppermost nearly sessile. The flowers are white or yellowish, upon short peduncles, and in axillary whorls, surrounding only half the stem. The calyx is tubular, pentangular, and bilabiate, with the upper lip tridentate and flattened, the lower cut into two pointed teeth. The corolla is also tubular and bilabiate, the upper lip less convex and notched, the lower three-cleft.

The plant is a native of the South of Europe. It has been introduced into this country, where it is cultivated in gardens, and grows wild along the fences of our roads and lanes. For medical use the herb should be cut before the appearance of the flowers, which begin to expand in July.

In the fresh state, it has a fragrant odour very similar to that of lemons; but is nearly inodorous when dried. The taste is somewhat austere and slightly aromatic. The herb contains a minute proportion of a yellowish or reddish-yellow essential oil, which has its peculiar flavour in a very high degree. It contains also tannin, bitter extractive, and gum.

Medical Properties and Uses. Balm scarcely produces any remedial operation upon the system. The quantity of oil which it contains is not more than sufficient to communicate a pleasant flavour to the infusion, which forms an excellent drink in febrile complaints, and when taken warm tends to promote the operation of diaphoretic medicines. W.

MENTHA PIPERITA. *U.S., Lond., Dub.*

Peppermint.

"Mentha piperita. Herba. *The herb.*" *U.S.*

Off. Syn. MENTHÆ PIPERITÆ HERBA. *Ed.*

Menthe poivrée, *Fr.;* Pfeffermünze, *Germ.;* Menta piperita, *Ital.;* Pimenta piperita, *Span.*

MENTHA. *Sex. Syst.* Didynamia Gymnospermia.—*Nat. Ord.* Labiatæ.

Gen. Ch. *Corolla* nearly equal, four-cleft; the broader segment emarginate. *Stamens* upright, distant. *Willd.*

Mentha piperita. Willd. *Sp. Plant.* iii. 79; Woodv. *Med. Bot.* p. 336. t. 120. Peppermint is a perennial herbaceous plant, with a creeping root, and erect, quadrangular, channeled, purplish, somewhat hairy stems, which are branched towards the top, and about two feet in height. The leaves are opposite, petiolate, ovate, serrate, pointed, smoother on the upper than the under surface, and of a dark green colour which is paler beneath. The flowers are small, purple, and disposed in terminal obtuse spikes, which are interrupted below. The calyx is tubular, furrowed, and five-toothed; the corolla is also tubular, with its border divided into four segments, of which the uppermost is broadest, and notched at its apex. The anthers are concealed within the tube of the corolla; the style projects beyond it, and terminates in a bifid stigma. The four-cleft germ is converted into four seeds, which are lodged in the calyx.

This species of mint is a native of Great Britain, whence it has been conveyed to the continent of Europe and to this country. In some parts of the United States, especially in New England, the western part of New York, Ohio, and New Jersey, it is largely cultivated for the sake of its volatile oil. We occasionally find it growing wild along the fences of our villages. The cultivators of this herb have observed, that in order to maintain its flavour in perfection, it is necessary to transplant the roots every three years. It should be cut for medical use in dry weather, about the period of the expansion of the flowers. These appear in August.

The herb, both in the recent and dried state, has a penetrating, grateful odour, somewhat resembling that of camphor. The taste is aromatic, warm, pungent, glowing, camphorous, bitterish, and attended with a sensation of coolness when air is admitted into the mouth. These properties depend on a volatile oil which abounds in the herb, and may be separated by distillation with water. (See *Oleum Menthæ Piperitæ.*) Peppermint also contains camphor, which rises with the oil. The virtues of the herb are imparted to water, and more readily to alcohol.

Medical Properties and Uses. Peppermint is a very grateful aromatic stimulant, much used for all the purposes to which medicines of this class are applied. To allay nausea, to relieve spasmodic pains of the stomach and bowels, to expel flatus, to cover the taste or qualify the nauseating or griping effects of other medicines, are among the most common of these purposes. The fresh herb, bruised and applied over the epigastrium, often allays sick stomach, and is especially useful in the cholera of children. The medicine may be given in infusion; but the volatile oil, either alone, or in some state of preparation, is almost always preferred.

Off. Prep. Aqua Menthæ Piperitæ, *Lond.*, *Ed.*, *Dub.;* Oleum Menthæ Piperitæ, *U.S.*, *Lond.*, *Ed. Dub.;* Spiritus Menthæ Piperitæ, *Ed.* W.

MENTHA PULEGIUM. *Dub.*

European Pennyroyal.

Off. Syn. PULEGIUM. Mentha Pulegium. *Lond.;* MENTHÆ PULEGII HERBA. *Ed.*

Menthe-pouliot, Pouliot, *Fr.;* Poleymünze, *Germ.;* Puleggio, *Ital.;* Poleo, *Span.*

MENTHA. See MENTHA PIPERITA.

Mentha Pulegium. Willd. *Sp. Plant.* iii. 82; Woodv. *Med. Bot.* p. 342. t. 122. This species of mint is distinguished by its roundish prostrate stems, its ovate obtuse somewhat crenate leaves, and its verticillate flowers. It is a native of Europe, and neither cultivated nor employed in this country. Our native pennyroyal belongs to a different genus. (See *Hedeoma Pulegioides.*) The Pulegium possesses similar properties, and is employed for the same purposes with the other mints.

Off. Prep. Aqua Pulegii, *Lond.*, *Ed.*, *Dub.;* Oleum Pulegii, *Lond.; Dub.* W.

MENTHA VIRIDIS. *U.S.*, *Lond.*, *Dub.*

Spearmint.

"Mentha viridis. Herba. *The herb.*" *U.S.*

Menthe a epi, *Fr.;* Grüne Münze, *Germ.;* Menta Romana, *Ital.;* Yerba buena puntiaguda, *Span.*

MENTHA. See MENTHA PIPERITA.

Mentha viridis. Willd. *Sp. Plant.* iii. 76; Woodv. *Med. Bot.* p. 338. t. 121. Spearmint, sometimes called simply *mint*, differs from the *M. piperita* chiefly in having sessile, or nearly sessile, lanceolate, naked leaves; elongated, interrupted, panicled spikes; setaceous bractes; and stamens longer than the tube of the corolla. Like the two preceding species, it is a native of England. In this country it is cultivated in gardens for domestic use, and in some places more largely for the sake of its oil. It also grows wild in low grounds in parts of the country which have been long settled. Its flowering season is August. According to Thomson, it should be cut in very dry weather, and, if intended for medical use, just as the flowers appear; if for obtaining the oil, after they have expanded.

The odour of spearmint is strong and aromatic, the taste warm and slightly bitter, less pungent than that of peppermint, but considered by some as more agreeable. These properties are retained for some time by the dried plant. They depend on a volatile oil which rises on distillation with water, and is imparted to alcohol and water by maceration. (See *Oleum Menthæ Viridis.*)

Medical Properties. The virtues and application of this plant are the same with those of peppermint.

Off. Prep. Aqua Menthæ Viridis, *Lond.*, *Dub.;* Infusum Menthæ Compositum, *Dub.;* Oleum Menthæ Viridis, *U.S.*, *Lond.*, *Dub.;* Spiritus Menthæ Viridis, *Lond.* W.

MENYANTHES. *U.S. Secondary.*

Buckbean.

"Menyanthes trifoliata. Radix. *The root.*" *U.S.*

Off. Syn. MENYANTHES. Menyanthes trifoliata. *Lond.;* MENYANTHIS TRIFOLIATÆ FOLIA. *Ed.;* MENYANTHES TRIFOLIATA. Folia. *Dub.*

Ményanthe, Trifle d'eau, *Fr.;* Bitterklee, *Germ.;* Trifoglio palustre, *Ital.;* Trifolio palustre, *Span.*

MENYANTHES. *Sex. Syst.* Pentandria Monogynia.—*Nat.Ord.* Gentianeæ.

Gen. Ch. Corolla hirsute. *Stigma* bifid. *Capsule* one-celled. *Willd.*

Menyanthes trifoliata.. Willd. *Sp. Plant.* i. 811; Bigelow, *Am. Med. Bot.* iii. 55. The *buckbean* or *marsh trefoil* has a perennial, long, round, jointed, horizontal, branching, dark-coloured root, about as thick as the finger, and sending out numerous fibres from its under surface. The leaves are ternate, and stand upon long stalks, which proceed from the end of the root, and are furnished at their base with sheathing stipules. The leaflets are obovate, obtuse, entire or bluntly denticulate, very smooth, beautifully green on their upper surface, and paler beneath. The scape or flower stalk is erect, round, smooth, from six to twelve inches high, longer than the leaves, and terminated by a conical raceme of whitish somewhat rose-coloured flowers. The calyx is five parted; the corolla funnel-shaped, with a short tube, and a five-cleft, revolute border, covered on the upper side with numerous long, fleshy fibres. The anthers are red and saggittate; the germ ovate, supporting a slender style longer than the stamens, and terminating in a bifid stigma. The fruit is an ovate, two-valved, one-celled capsule containing numerous seeds.

This beautiful plant is a native both of Europe and North America, growing in boggy and marshy places which are always moist, and occasionally overflowed with water. It prevails, in the United States, from the northern boundary to Virginia. In this country the flowers appear in May, in England not till June or July. All parts of it are medicinal. The leaves are directed by the Edinburgh College, the whole plant by those of London and Dublin, the root by the Pharmacopœia of the United States.

The taste of buckbean is intensely bitter and somewhat nauseous, the odour of the leaves faint and disagreeable. The virtues of the plant depend on a bitter extractive matter which is dissolved by water and alcohol.

Medical Properties and Uses. With the ordinary properties of the bitter tonics, menyanthes unites a cathartic power, and in large doses is apt to vomit. It was formerly held in high estimation in Europe as a remedy in numerous complaints, among which were intermittents, rheumatism, scrofula, scurvy, dropsy, jaundice, and various cachectic and cutaneous affections. In most of these complaints it was administered under a vague impression of its alterative powers. It is scarcely ever employed in this country; but as it is a native plant, capable of useful application in cases where a combined tonic and purgative effect is demanded, it is desirable that our country practitioners should be aware of its properties, and prepared to take advantage of them should occasion offer.

The dose of the powdered leaves or root as a tonic is from twenty to thirty grains; of an infusion prepared with half an ounce to a pint of boiling water, from one to two fluidounces; and of the extract ten or fifteen grains, to be repeated three or four times a day. A drachm of the powder, or a gill of the strong decoction, generally purges, and often occasions vomiting.

W.

MEZEREUM. *U.S.*

Mezereon.

"Daphne mezereum. Radicis cortex. *The bark of the root.*" *U.S.*

Off. Syn. MEZEREI CORTEX. Daphne Mezereum. Radicis cortex. *Lond.;* DAPHNES MEZEREI CORTEX. *Ex radice. Ed.;* MEZEREON. DAPHNE MEZEREUM. Cortex. *Dub.*

Bois gentil, *Fr.;* Kellerhals, *Germ.;* Mezereo, *Ital.;* Mecereon, *Span.*

DAPHNE. *Sex. Syst.* Octandria Monogynia.—*Nat. Ord.* Thymeleæ.

Gen. Ch. *Calyx* none. *Corolla* four-cleft, withering, enclosing the stamens. *Drupe* one-seeded. *Willd.*

All the species of Daphne are possessed of active properties; and though the *D. Mezereum* is the only one recognised in the Pharmacopœias, either of the United States or Great Britain, at least two others, the *D. Gnidium* and *D. Laureola,* probably contribute to furnish the mezereon of commerce, and have been adopted as officinal in the French Codex.

1. *Daphne Mezereum.* Willd. *Sp. Plant.* ii. 415; Woodv. *Med. Bot.* p. 717. t. 245. This is a very hardy shrub, three or four feet high, with a branching stem, and a smooth dark-gray bark, which is very easily separable from the wood. The leaves spring from the ends of the branches, are deciduous, sessile, obovate lanceolate, entire, smooth, of a pale green colour, somewhat glaucous beneath, and about two inches long. They are preceded by the flowers, which appear very early in spring, and sometimes bloom even amidst the snow. These are of a pale rose colour, highly fragrant, and disposed in clusters, each consisting of two or three flowers, forming together a kind of spike at the upper part of the stem and branches. At the base of each cluster are deciduous floral leaves. The fruit is oval, shining, fleshy, of a bright red colour, and contains a single round seed. Another variety produces white flowers and yellow fruit.

This species of Daphne is a native of Great Britain and the neighbouring continent, in the northern parts of which it is particularly abundant. It is cultivated in Europe both for medicinal purposes, and as an ornamental plant, and is occasionally found in our own gardens. It flowers in February, March, or April, according to the greater or less mildness of the climate.

2. *D. Gnidium.* Willd. *Sp. Plant.* ii. 420. In this species, called *garou* or *sain-bois* by the French, the leaves are linear lanceolate, acute, entire, smooth, and irregularly but closely set upon the branches. The flowers are white, downy, odoriferous, and disposed in terminal panicled racemes. The fruit is globular, dry, at first green, but ultimately black. The *D. Gnidium* grows in dry uncultivated places, in the South of Europe, and flowers in June. In France its bark is used indiscriminately with that of the former species.

3. *D. Laureola.* Willd. *Sp. Plant.* ii. 418; *Eng. Bot.* t. 119. The *D. Laureola* or *spurge laurel* is a strongly marked species, resembling the laurel, from which it derived its name. The leaves are thick-set, evergreen, lanceolate, acute, entire, coriaceous, smooth, and shining. The flowers are of a greenish colour, and disposed in axillary five-flowered racemes. The fruit is of a deep red colour, approaching to black. The plant is common in the moist woods of the southern and temperate parts of Europe. Its bark is said to be frequently substituted for that of the *D. Mezereum.*

The bark of the root is the part of the mezereon plant directed in the

Pharmacopœias. In Great Britain the root itself is frequently kept in the shops; and it was formerly brought to a considerable extent into the United States. But the mezereon with which our markets are now supplied is evidently the bark of the stem, and is brought chiefly from Germany. There is no reason to believe it inferior in virtues to that derived from the root. The berries and leaves of the plant are also possessed of active properties; and the former have sometimes proved fatal to children, who have been attracted by their beautiful colour. Pallas states that they are used as a purgative by the Russian peasants, and that thirty berries are required to produce this effect. The French authors observe that fifteen are sufficient to kill a Frenchman.

Properties. Mezereon, as it comes to us, is usually in strips from two to four feet long and about an inch broad, sometimes flat, sometimes partially rolled, and always folded in bundles, or wrapped in the shape of balls. It is covered externally with a grayish or reddish-brown wrinkled epidermis, very thin, and easily separable from the bark. Beneath the epidermis is a soft greenish tissue. The inner bark is tough, pliable, fibrous, striated, and of a whitish colour. When fresh it has a nauseous smell, but in the dry state is nearly inodorous. Its taste is at first sweetish, but afterwards highly acrid, and even corrosive. It yields its virtues to water by decoction. Vauquelin ascertained the presence of a peculiar principle in the bark of the *D. Alpina.* This has subsequently been discovered in other species, and has received the name of *daphnin.* Gmelin and Bär found it in the bark of the *D. Mezereum* associated with wax, an acrid resin, a yellow colouring matter, a reddish-brown extractive matter, an uncrystallizable and fermentable sugar, a gummy matter containing azote, ligneous fibre, malic acid, and several malates. *Daphnin* is in prismatic crystals grouped together, colourless, transparent, brilliant, slightly soluble in cold water, very soluble in boiling water, ether, and alcohol, without odour, and of a bitter, somewhat austere taste. It is obtained by treating the alcoholic extract of the bark with water, decanting the solution, precipitating with subacetate of lead, filtering, decomposing the excess of the subacetate by sulphuretted hydrogen, again filtering, evaporating to dryness, submitting the residue to the action of anhydrous alcohol, and evaporating the alcoholic solution to the point of crystallization. Though daphnin is probably not inactive, it is not the principle upon which the virtues of mezereon chiefly depend. Vauquelin thinks that in the recent plant these reside in an essential oil, which by time and exposure is changed into a resin, without losing its activity. The acrid resin, observed by Gmelin and Bär, is probably the characteristic principle to which the bark owes its vesicating properties. It is obtained separate by boiling mezereon in alcohol, allowing the liquor to cool in order that it may deposite some wax which it has taken up, then distilling off the alcohol, and treating the residue with water, which leaves the resin. This is of a dark green, almost black colour, hard and brittle, and of an exceedingly acrid and permanent taste. In the isolated state, it is slightly soluble in water, and much more so when combined with the other principles of the bark. It appears, however, not to be a pure proximate principle, but rather a resinoid combination of an acrid vesicating fixed oil with another substance.

Medical Properties and Uses. The recent bark applied to the skin produces inflammation followed by vesication, and has been popularly used as an epispastic from time immemorial in some of the southern countries of Europe. The dried bark, though less active, is possessed of a similar property, and is occasionally employed in France by regular practitioners for the purpose of forming issues, in cases which do not admit of the use of

Spanish flies. A small square piece of the bark, moistened with vinegar, is applied to the skin, and renewed twice a day till a blister is formed, and occasionally afterwards in order to maintain the discharge. It is slow in its operation, generally requiring from twenty-four to forty-eight hours to vesicate. An epispastic ointment is proposed by Guibourt, consisting of two drachms of the alcoholic extract of mezereon, nine ounces of lard, and one of wax. He employs the bark of the *D. Gnidium* (*garou*); but that of the other species will answer the same purpose. This preparation would form an excellent substitute for the savine ointment for maintaining the discharge from blistered surfaces. It may also be applied advantageously to obstinate, ill-conditioned, indolent ulcers.

Internally administered, mezereon is a stimulant capable of being directed to the skin or kidneys, and in large doses apt to excite purging, nausea, and vomiting. In overdoses it produces all the fatal effects of the acrid poisons. It had at one time much reputation as a remedy in the secondary stages of the venereal disease, and still enters as an ingredient into the officinal compound decoction of sarsaparilla. It has also been thought to act favourably as an alterative in scrofulous affections, chronic rheumatism, and obstinate diseases of the skin. For this purpose it is usually administered in decoction. (See *Decoctum Mezerei.*) Dr. Withering cured a case of difficult swallowing, arising from paralysis, by directing the patient to chew frequently small pieces of the root. The affection, which had continued three years, was removed in a month. The dose of the bark in substance may be stated at ten grains, though it is seldom used in this way.

Off. Prep. Decoctum Mezerei, *Dub, Ed.;* Decoctum Sarsaparillæ Compositum, *U.S., Lond., Dub.* W.

MONARDA. *U.S.*

Horsemint.

"Monarda punctata. Herba. *The herb.*" *U. S.*

Monarda. *Sex. Syst.* Diandria Monogynia.—*Nat. Ord.* Labiatæ.

Gen. Ch. *Calyx* five-toothed, cylindric, striate. *Corolla* ringent, with a long cylindric tube; *upper lip* linear, nearly straight and entire, involving the filaments, *lower lip* reflected, broader, three-lobed, the middle lobe longer. *Nuttall.*

Monarda punctata. Willd. *Sp. Plant.* i. 126; *Am. Med. Recorder*, vol. ii. p. 496. This is an indigenous perennial or biennial plant, with herbaceous, obtusely angled, downy, whitish, branching stems, which rise one or two feet in height, and are furnished with oblong lanceolate, remotely serrate, smooth, punctate leaves. The flowers are yellow, spotted with red or brown, and are disposed in numerous whorls, provided with lanceolate, coloured bractes, longer than the whorl.

The horsemint grows in light gravelly or sandy soils from New Jersey to Louisiana, and flowers from June to September. The whole herb is employed. It has an aromatic smell, and a warm, pungent, bitterish taste; and abounds in a volatile oil, which may be separated by distillation with water.

Medical Properties and Uses. Horsemint is stimulant and carminative; but is seldom used in regular practice. In the state of infusion it is occasionally employed in families as a remedy for flatulent colic and sick stomach, and for other purposes to which the aromatic herbs are applied. It was introduced into the primary catalogue of the United States Pharmacopœia on account of the volatile oil which it affords. (See *Oleum Monardæ.*)

Off. Prep. Oleum Monardæ, *U.S.* W.

MORI BACCÆ. *Lond.*

Mulberries.

"Morus nigra. *Baccæ.*" *Lond.*

Off. Syn. MORUS NIGRA. Baccæ. *Dub.*

Mures, *Fr.;* Schwarze Maulbeeren, *Germ.;* Morone, *Ital.;* Moras, *Span.*

Morus. *Sex. Syst.* Monœcia Tetrandria.—*Nat. Ord.* Urticæ, *Juss.;* Artocarpeæ, *R. Brown, Lindley.*

Gen. Ch. Male. *Calyx* four-parted. *Corolla* none. Female. *Calyx* four-leaved. *Corolla* none. *Styles* two. *Calyx* berried. *Seed* one. *Willd.*

Morus nigra. Willd. *Sp. Plant.* iv. 36; Woodv. *Med. Bot.* p. 712. t. 243. This species of mulberry is distinguished by its cordate ovate, or lobed, unequally toothed, and scabrous leaves. It is a tree of middle size, supposed to have been brought originally from Persia into Italy, and thence spread over Europe and America. Its leaves afford food for the silk-worm; and the bark of the root, which is bitter and slightly acrid, has been employed as a vermifuge, especially in cases of the tape-worm, in the dose of two drachms infused in eight ounces of boiling water. But the fruit is the only portion directed by the Colleges.

This is oblong oval, of a dark reddish-purple almost black colour; and consists of numerous minute berries united together and attached to a common receptacle, each containing a single seed, the succulent envelope of which is formed by the calyx. It is inodorous, has a sweet, mucilaginous, acidulous taste, and abounds in a deep red juice. The sourish taste is owing, according to Hermbstadt, to the presence of tartaric acid.

Medical Properties and Uses. Mulberries are refreshing and laxative, and serve to prepare a grateful drink well adapted to febrile cases. A syrup is prepared from them, and used as a pleasant addition to gargles in inflammation of the throat. They are, however, more used as food than medicine. Our native mulberry, the fruit of the *M. rubra,* is quite equal to that of the imported species. The *M. alba,* originally from China, and now extensively cultivated as a source of food for the silk-worm, bears a white fruit, which is sweeter and less grateful than the others.

Off. Prep. Syrupus Mori. *Lond.* W.

MOSCHUS. *U.S., Lond., Ed., Dub.*

Musk.

"Moschus moschiferus. Concretum sui generis. *A peculiar concrete substance.*" *U.S.*

Musc, *Fr.;* Bisam, *Germ.;* Muschio, *Ital.;* Almizcle, *Span.*

Moschus. *Class* Mammalia. *Order* Pecora.

Gen. Ch. *Horns* none. *Fore teeth* eight in the lower jaw. *Tusks* one on each side in the upper jaw, projecting out of the mouth.

Moschus moschiferus. Gmelin, *Syst. Nat.* i. 172; Rees's *Cyclopædia.* This animal bears a close resemblance to the deer in shape and size. It is usually less than three feet in length, with haunches considerably more elevated than the shoulders. From its upper jaw two tusks project downwards out of the mouth, each about two inches long, curved backwards, and serving to extract the roots which are used as food by the animal. The ears are long and narrow and the tail very short. The fleece, which consists of strong, elastic, undulated hairs, varies in colour with the season, the age of the animal, and perhaps the place which it inhabits. The general colour is a deep iron gray. The individual hairs are whitish near the root, and fawn-coloured or blackish towards the tip. The musk is contained in an oval, hairy, projecting sac, found only in the male, situated between the umbilicus and the prepuce, from two to three inches long, and from one to two broad, communicating externally by a small hairy orifice at its anterior part, and marked posteriorly by a groove or furrow which corresponds with the opening of the prepuce. It is lined internally by a smooth membrane, which is thrown into a number of irregular folds forming incomplete partitions. In the vigorous adult animal, the sac sometimes contains six drachms of musk; but in the old seldom more than two drachms, and none in the young. The musk is secreted by the lining membrane, and in the living animal forms a consistent mass, which on the outside is compact and marked with the folds of the membrane, but is less firm towards the centre, where there is sometimes a vacant space. As first secreted it is probably in the liquid state, and a portion is occasionally forced out by the animal, to which it communicates its odour.

The musk deer inhabits the vast mountainous regions of central Asia, extending from India to Siberia, and from the country of the Turcomans to China. It is an active and timid animal, springing from rock to rock with surprising agility, and frequenting the snowy recesses, and most inaccessible crags of the mountains. Concealing itself during the day, it chooses the night for roaming in search of food; and though said to be abundant in its native regions, is taken with difficulty. It is hunted for its hide, as well as for the musk. As soon as the animal is killed the sac is cut off, and dried with its contents; and in this state is sent into the market.

Musk varies in quality with the country inhabited by the animal. That procured from the mountains on the southern borders of Siberia, and brought into the market through Russia, is comparatively feeble. The best is imported from China, and is said to be the product of Tonquin. A variety in-ermediate between these is procured in the Himalaya Mountains and Thibet, and sent to Calcutta. We derive our chief supply from Canton, though, when the drug is scarce, portions are occasionally brought hither from Europe.

Two varieties are distinguished in the market, the Chinese and Russian. Both come in sacs convex and hairy on one side, flat and destitute of hair on the other. The Chinese, which is the most highly valued, is in bags of a rounder shape, covered with brownish-yellow or reddish-brown hairs, and containing at most a drachm and a half of large grained, dark, strong-scented musk, having an ammoniacal odour. The Russian, which is contained in longer and larger bags, is small grained, of a clear yellow-brown colour, of a weaker and more fetid odour, with less smell of ammonia.

Properties. Musk is in grains or lumps concreted together, soft and unctuous to the touch, and of a reddish-brown or ferruginous colour, resembling that of dried blood. The odour is peculiar, strong, penetrating, and so powerfully diffusive, that one part of musk communicates its smell to more than 3000 parts of inodorous powder. (*Fée.*) In some delicate individuals it produces headach and other disagreeable symptoms, and has even given rise to convulsions. The taste is bitter, disagreeable, and somewhat acrid.

The colour of the powder is reddish-brown. Musk is inflammable, burning with a white flame, and leaving a light spongy charcoal. It yields, upon analysis, a great number of proximate principles. Guibourt and Blondeau obtained water, ammonia, stearin, elaïn, cholesterin, an acid oil combined with ammonia, a volatile oil, muriates of ammonia, potassa, and lime, an uncertain acid saturated by the same bases, gelatin, albumen, fibrin, a highly carbonated matter soluble in water, a soluble calcareous salt with a combustible acid, carbonate and phosphate of lime, hair, and sand. (*Annal. de Phys. et de Chim.* ix. 327.) According to the same chemists, it contains 47 per cent. of volatile matter, thought by some to be chiefly ammonia, by others to be a compound of ammonia and volatile oil. Theimann obtained only from 10 to 15 per cent. But the quantity of volatile as well as of soluble matter varies exceedingly in different specimens. Thus Theimann found from 80 to 90 per cent. of matter soluble in water, Buchner only 54.5 per cent., and other chemists intermediate proportions. The proportion soluble in alcohol, as ascertained by different experimenters, varies from 25 to 62 per cent. Sulphuric ether is a good solvent. The watery infusion has a yellowish-brown colour, a bitterish taste, a strong smell of musk, and an acid reaction. The alcoholic tincture is transparent, and of a reddish-brown colour. Dr. A. T. Thomson is mistaken in stating that it has scarcely any of the peculiar odour of the medicine. The action of potassa upon musk is accompanied with the extrication of ammonia. By the influence of heat and moisture long continued, ammonia is developed, which acts upon the fatty matter, producing a substance resembling adipocire, but, according to Guibourt, without diminishing the activity of the medicinal principles. The correctness, however, of this opinion, is perhaps questionable; and it is advisable to preserve the musk as much as possible unaltered. When kept in glass bottles, in a situation neither moist nor very dry, it remains for a great length of time without material change.

Adulterations. The price of this medicine is so high, and the sources of supply so limited, as to offer strong temptations to adulteration; and it is said that little of the genuine, unmixed musk is to be found in the market. The sophistication commences with the Chinese, and is completed in Europe and this country. A common practice in the East is to open the sac, and to supply the place of the musk with an adulterated mixture. Sometimes the scrotum of the animal is filled with this mixture, and not unfrequently the sacs are manufactured out of the skin. Dried blood, from its resemblance in appearance to musk, is among the most common adulterations; but besides this, sand, lead, iron-filings, hair, animal membrane, tobacco, the dung of birds, wax, benzoin, storax, asphaltum, and other substances are introduced. These are mixed with a portion of musk, the powerful odour of which is diffused through the mass, and renders the discovery of the fraud sometimes difficult. It is said that the Chinese sometimes mix the musk of Tonquin with that of Siberia. The bags containing the drug should have the characters before described as belonging to the natural sac, and should present no evidence of having been opened. The slit is sometimes carefully sewed up, sometimes glued together. The former condition may be discovered by close inspection, the latter by immersion in hot water. Musk which burns with difficulty, which has a feeble odour, and a colour either pale or entirely black, which feels gritty to the finger, is very moist, or contains obvious impurities, should be rejected.

Medical Properties and Uses. Musk is stimulant and antispasmodic, increasing the vigour of the circulation, and exalting the nervous energy, without producing, either as an immediate or secondary effect, any considerable derangement of the purely cerebral functions. Its medical uses are such as may be inferred from its general operation. In almost all spasmodic diseases, so far as mere relaxation of spasm is desirable, it is more or less efficacious; but peculiar advantages may be expected from it in those cases in which a prostrate condition of the system, attended with great nervous agitation, or irregular muscular action, calls for the united influence of a highly diffusible stimulant and powerful antispasmodic. Such are very low cases of typhus disease, accompanied with subsultus tendinum, tremors, and singultus. Such also are many instances of gout in the stomach, and other spasmodic affections of this organ. In very obstinate hiccough we have found it more effectual than any other remedy; and have seen great advantage from its use in those alarming and dangerous convulsions of infants which have their origin in spasm of the intestines. It is said to have done much good combined with opium, and administered in very large doses in tetanus. Epilepsy, hysteria, asthma, pertussis, palpitations, cholera, and colic, are among the numerous spasmodic affections in which circumstances may render the employment of musk desirable. The chief obstacles to its general use are its very high price, and the great uncertainty as regards the degree of its purity. Musk was unknown to the ancients. Aëtius was the first writer who noticed it as a medicine. It was introduced into Europe through the Arabians, from whose language its name was derived.

It may be given in the form of pill or emulsion. The medium dose is ten grains, to be repeated every two or three hours. In the cases of children it may be given with great advantage in the form of enema. The tincture, which is an officinal preparation, is sometimes prescribed.

Off. Prep. Mistura Moschi, *Lond.;* Tinctura Moschi, *U.S.*, *Dub.* W.

◆

MOXA. *Dub.*

Moxa.

"Artemisia Chinensis et A. Indica. *Folia.*" *Dub.*

The term *moxa* is employed to designate small masses of combustible matter, intended, by being burnt slowly in contact with the skin, to produce an eschar. They are of various forms, and made of different materials. The Chinese moxa is in small cones, from eight to twelve lines in height; and is prepared from the leaves of the *Artemisia Chinensis* and *A. Indica.* According to some authors, the part used is the down which covers the leaves and stems; but others, with greater probability, assert that it is a fine lanuginous substance prepared from the leaves by beating them in a mortar. A coarser and a finer product are obtained, the former of which is used for tinder, the latter worked up into moxa. A similar moxa has been made in France, by a similar process, from the leaves of the *A. vulgaris* or common European mugwort.

Various substitutes have been proposed for the Chinese moxa, all composed of some light, porous, soft, inflammable substance, which burns slowly, and thus allows the heat to be regulated according to the effect desired. Linen rolled into a cylinder, cotton formed into the same shape and enclosed in a piece of linen, cords of cotton in small masses of various shapes, and even common spunk made from the agaric of the oak, have been employed by different persons with the desired effect. But all these bodies are subject to the inconvenience of requiring to be constantly blown upon in order that their combustion may be sustained.

To remedy this defect, cotton impregnated with nitre has been recommended; and the moxa usually employed is prepared from this substance. It is important that the impregnation should be uniform, as otherwise different parts of the cylinder, burning with different degrees of rapidity, would produce unequal effects upon the skin. The following process is commonly employed in France. One pound of cotton is introduced into a vessel containing two ounces of nitre dissolved in half a gallon of water, and a moderate heat applied, till all the liquid is evaporated. The cotton when perfectly dry is formed into thin, narrow sheets, which are rolled round a central cord of linen, so as to form a cylinder from half an inch to an inch in diameter, and several inches long. This is enclosed in a covering of silk or linen sown firmly around it; and when used may be cut by a razor into transverse slices a few lines in length. By leaving a hole in the centre of the cylinder, the combustion will be rendered more vigorous, and a deeper eschar produced.

The pith of the *Helianthus annuus*, or common sun-flower, has been proposed by M. Percy for the preparation of moxa, for which it is well adapted by the nitre which it naturally contains, and which enables it to burn without insufflation. The stem is cut into transverse sections about half an inch in thickness, which must be dried carefully, and afterwards kept in a perfectly dry place. They have this advantage in application, that, in consequence of the retention of the cortical portion, they may be held with impunity, while burning, between the fingers of the operator. They are, however, frequently defective in consequence of an insufficiency of nitre in the pith, or of the unequal inflammability of different parts of it. The stems of the plant employed should have attained perfect maturity.

M. Robinet has perfected the preparation of moxa, by combining the advantages of the two kinds last described. He rolls cotton round a small central cylinder of pith, and envelopes the whole in a piece of muslin, which is more or less firmly applied, according to the degree of compactness required. The cylinders thus made burn without assistance, uniformly, and with a rapidity proportionate to their firmness.

Dr. Jacobson, of Copenhagen, has recently proposed, as a substitute for the ordinary forms of moxa, small cylinders formed out of strips of paper embued with a solution of chromate of potassa; and cotton, impregnated with the solution of chlorate of potassa instead of nitre, is said to answer an excellent purpose. (*Journ. de Pharm.* xix. 608.)

Medical Use. Cauterization by fire, in the treatment of disease, has been commonly practised among savage and half civilized nations from the earliest periods of history, and has not been unknown as a remedy in the most polished communities. The ancient Egyptians and Greeks were acquainted with the use of moxa; and in China, Japan and other countries of Asia, it appears to have been employed from time immemorial. From these countries the early Portuguese navigators introduced it into Europe; and the term *moxa* is said to have been derived from their language, though supposed by some to be of Chinese origin. The true Chinese name is said to be *kiew.* (*Percy and Laurent.*) Within a few years the remedy has become very popular in France, and has attracted some attention in this country, though not generally employed. It acts on the principle of revulsion; relieving deep seated inflammation, and local irritation whether vascular or nervous, by inviting the current of excitement to the skin. In some cases it may also operate advantageously by the propagation of a stimulant impression to neighbouring parts in which the natural actions are enfeebled. The idea that moxa produces a peculiar effect by the substances which result from its combustion, is probably without foundation.

The celebrated Larrey is among those who have contributed most to bring this remedy into repute. The diseases in which it is recommended by this author are amaurosis, loss of taste, deafness, paralytic affections of the muscular system, asthma, chronic catarrh and pleurisy, phthisis, chronic engorgement of the liver and spleen, rachitis, diseased spine, coxalgia, and other forms of scrofulous and rheumatic inflammation of the joints. It has also been used advantageously in neuralgic affections, and is applicable to chronic complaints generally, in which powerful external revulsion is indicated.

The parts of the body upon which, according to Larrey, it should not be applied are the cranium when protected only by the skin and pericranium; the eye-lids, nose, and ears; the skin over the larynx, trachea, and mammary glands, over superficial tendons, projecting points of bones, and articular prominences in which the capsular ligament might be involved; the anterior surface of the abdomen; and the privates.

As a general rule it should be applied as near as possible to the seat of the disease; and, in neuralgic or paralytic cases, at the origin or over the course of the nerves proceeding to the part affected. Some advise that the cylinder be attached to the skin by some adhesive liquid; but a more general practice is to retain it in the proper position by a pair of forceps or other instrument. Larrey recommends that the skin around it be covered with a piece of moistened lint, having a hole in its centre to admit the base of the cylinder. The moxa should be set on fire at the summit, and the combustion sustained if necessary by the breath, the blow-pipe, or the bellows The size of the cylinder should vary, according to the effect desired, from half an inch to an inch or more in diameter, and from a few lines to an inch in height. Any degree of effect may be obtained, from a slight inflammation to the death of the skin, by regulating the time during which the moxa is allowed to burn. When a slough is required, it should be suffered to burn until consumed. The first sensation experienced is not disagreeable; but the operation becomes gradually more painful, and towards the close is for a short time very severe.

W.

MYRISTICA. *U.S.*

Nutmeg.

"Myristica moschata. Nuclei. *The kernels.*" *U. S.*

Off. Syn. MYRISTICÆ NUCLEI. Myristica moschata. Nuclei et oleum eorum expressum. *Lond.;* MYRISTICÆ MOSCHATÆ NUCLEUS. *Ed.;* NUX MOSCHATA. MYRISTICA MOSCHATA. Nucleus et oleum volatile, *Dub.*

Noix muscade, *Fr.;* Muskatnuss, *Germ.;* Noce moscata, *Ital.;* Nuez moscada, *Span.;* Nortenmoskat, *Dutch.*

MYRISTICÆ MOSCHATÆ INVOLUCRUM NUCLEI. *Vulgo*, MACIS. *Ed.*

Mace.

Off. Syn. MYRISTICA MOSCHATA. Involucrum MACIS dictum. *Dub.*

Macis, *Fr.;* Muskatblüthe, *Germ.;* Macis, *Ital.;* Macias, *Span.*

Myristica. *Sex. Syst.* Diœcia Monadelphia,—*Nat. Ord.* Lauri, *Juss.;* Myristiceæ, *R. Brown, Lindley.*

Gen. Ch. Male. *Calyx* none. *Corolla* bell-shaped, trifid. *Filament* columnar. *Anthers* six or ten united. Female. *Calyx* none. *Corolla* bell-shaped, trifid, deciduous. *Style* none. *Stigmas* two. *Drupe* with a nut involved in an arillus with one seed. *Willd.*

Myristica moschata. Willd. *Sp. Plant.* iv. 869; Woodv. *Med. Bot.* p. 698. t. 238. The nutmeg-tree is about thirty feet high, with numerous branches, and an aspect somewhat resembling that of the orange tree. The leaves stand alternately on short footstalks, are oval lanceolate, pointed, entire, undulated, obliquely nerved, from two to three inches long and about an inch and a half broad, bright green on their upper surface, whitish beneath, and of an aromatic taste. The flowers are male and female upon different trees. The former are disposed in axillary, peduncled, solitary clusters; the latter are single, solitary, and axillary; both are minute and of a pale yellowish colour. The fruit, which appears on the tree mingled with the flowers, is round or oval, of the size of a small peach, with a smooth surface, at first pale-green, but yellow when ripe, and marked with a longitudinal furrow. The external covering, which is at first thick and fleshy, and abounds in an austere, astringent juice, afterwards becomes dry and coriaceous, and separating into two valves from the apex, discloses a yellowish or reddish reticulated membrane or arillus, commonly called *mace*, closely investing a slender, brown, shining shell, which contains the kernel or *nutmeg*. Not less than eight varieties of this species are said by Crawford to be cultivated in the East Indies; but they have not been well defined.

The *Myristica moschata* is a native of the Moluccas and other neighbouring islands, and abounds especially in that small cluster distinguished by the name of Banda, whence the chief supplies of nutmegs have long been derived. The plant, however, is now cultivated in Sumatra, Java, Penang, and some other parts of the East Indies; and has been introduced into the Isle of France and Bourbon, the French colony of Cayenne, and some of the West India islands.

The tree is raised from the seed. It does not flower till the eighth or ninth year, after which it bears flowers and fruit together, without intermission; and is said to continue bearing for seventy or eighty years. Little trouble is requisite in its cultivation. A branch of the female tree is grafted into all the young plants when about two years old, so as to ensure their early fruitfulness. In the Moluccas the tree yields three crops annually. The fruit is gathered by the hand, and the outside covering is rejected as useless. The mace is then carefully separated, so as to break it as little as possible, is flattened, and dried in the sun. It is afterwards sprinkled with salt water, with the view of contributing to its preservation. The nuts are dried in the sun or by ovens, and exposed to smoke, till the kernel rattles in the shell. They are then broken open, and the kernels having been removed, and steeped for a short time in a mixture of lime and water, probably in order to preserve them from the attack of worms, are next cleaned, and packed in casks or chests for exportation.

Nutmegs are brought to this country either directly from the East Indies, or indirectly through England and Holland. They are also occasionally imported in very small quantities from the West Indies.

Properties. The nutmeg, *nux moschata*, is of a roundish or oval shape, obtuse at the extremities, marked with vermicular furrows, of a grayish colour, hard, smooth to the touch, yielding readily to the knife or the grater, but not very pulverulent. When cut or broken it presents a yellowish surface, varied with reddish-brown, branching, irregular veins, which give to it a marbled appearance. These dark veins abound in oily matter, upon which the medicinal properties depend. The odour of nutmeg is delightfully fragrant, the taste warm, aromatic, and grateful. Its virtues are extracted by alcohol and ether. M. Bonastre obtained from 500 parts, 120 of a white insoluble oily substance (stearin), 38 of a coloured soluble oil (elaïn), 30 of volatile oil, 4 of acid, 12 of fecula, 6 of gum, 270 of lignin; and 20 parts were lost. (*Journ. de Pharm.* ix. 281.) The *volatile oil* is obtained by distillation with water. It is of a pale straw-colour, limpid, lighter than water, with a pungent spicy taste, and a strong smell of nutmeg. It consists of two oils, which may be separated by agitation with water, one rising to the surface, the other sinking to the bottom. Upon standing it deposites a stearoptene in the form of a crystalline crust, which is called by John *myristicin.* (*Berzelius, Trait. de Chim.*) The volatile oil of nutmegs is ranked among the officinal medicines by the Dublin College. By pressure with heat an oily matter is obtained from the kernels, which becomes solid on cooling, and is commonly though erroneously called *oil of mace.* It consists of fixed and volatile oil united. (See *Oleum Myristicæ.*) Both the volatile and expressed oils are imported from the East Indies.

It is said that nutmegs are often punctured and boiled in order to extract their essential oil, and the orifice afterwards closed so carefully as not to be discoverable unless by breaking the kernel. The fraud may be detected by their greater levity. They are also apt to be injured by worms, which, however, attack preferably those parts which are least impregnated with the volatile oil. We are told that the Dutch heat them in a stove in order to deprive them of the power of germinating, and thus prevent the propagation of the tree. The small and round nutmegs are preferred to those which are large and oval. They should be rejected when very light, with a feeble taste and smell, worm eaten, musty, or marked with black veins.

A variety of nutmeg was formerly in the market, derived from the *M. tomentosa* of Willdenow, the *M. Malabarica* of Lamarck, distinguished from that just described by its much greater length, its elliptical shape, the absence of the brown veins, and its comparatively feeble odour, and disagreeable taste. It was called *male* or *wild nutmeg*, the other being designated as the *female* or *cultivated nutmeg.*

Mace is in the shape of a flat membrane irregularly slit, smooth, soft, flexible, of a reddish or orange-yellow colour, and an odour and taste closely resembling those of nutmeg. It consists, according to M. Henry, of an essential oil in small quantity; a fixed oil, odorous, yellow, soluble in ether, insoluble in boiling alcohol; another fixed oil, odorous, red, soluble in alcohol and ether in every proportion; a peculiar gummy matter, analogous to amydin and gum, constituting one-third of the whole mass; and a small proportion of ligneous fibre. Mace yields a volatile oil by distillation, and a fixed oil by pressure. Neumann found the former heavier than water. The latter is less consistent than the fixed oil of nutmegs. Mace is inferior when it is brittle, less than usually divided, whitish or pale yellow, or with little taste and smell.

Medical Properties and Uses. Nutmeg unites with the medicinal properties of the ordinary aromatics, considerable narcotic power. In the quantity of two or three drachms it has been known to produce stupor and delirium; and dangerous if not fatal consequences are said to have followed its free use in India. It is employed to cover the taste or correct the operation of other medicines, but more frequently as an agreeable addition to farinaceous articles of diet, and to various kinds of drink in cases of languid appetite, and delicate stomach. It is usually given in substance, and is brought by grating to the state of a powder. *Mace* possesses properties essentially the same with those of nutmeg, but is less used as a medicine. The dose of either is from five to twenty grains. As the virtues of nutmeg depend chiefly if not exclusively on the volatile oil, the latter may be substituted, in the dose of two or three drops, whenever a liquid preparation is desirable.

The ancients were wholly unacquainted with this spice; and Avicenna is said to be the first author by whom it is noticed.

Off. Prep. Confectio Aromatica, *Lond.*, *Dub.;* Electuarium Catechu Compositum, *Ed.;* Pulvis Carbonatis Calcis Compositus, *Ed.;* Spiritus Ammoniæ Aromaticus, *Dub.;* Spiritus Armoraceæ Compositus, *Dub.;* Spiritus Lavandulæ Compositus, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Spiritus Myristicæ, *U. S.*, *Lond.*, *Ed.*, *Dub.;* Syrupus Rhei Aromaticus, *U. S.;* Trochisci Calcis Carbonatis, *U.S.*, *Ed.;* Trochisci Magnesiæ, *U. S.*, *Ed.* W.

MYROXYLON. *U.S.*

Balsam of Peru.

"Myroxylon Peruiferum. Succus. *The juice.*" *U. S.*

Off. Syn. BALSAMUM PERUVIANUM. Myroxylon Peruiferum. Balsamum. *Lond.;* MYROXYLI PERUIFERI BALSAMUM. *Ed.;* MYROXYLUM PERUVIANUM. Balsamum. *Dub.*

Baume de Perou, *Fr.;* Peruvianischer Balsam, *Germ.;* Balsamo del Peru, *Ital.;* Balsamo negro, *Span.*

MYROXYLON. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Leguminosæ.

Gen. Ch. *Calyx* bell-shaped, five-toothed. *Petals* five, the upper one larger than the others. *Germen* longer than the corolla. *Legume* with one seed only at the point. *Willd.*

Myroxylon Peruiferum. Willd. *Sp. Plant.* ii. 546; Lambert's *Illustrations*, A.D. 1821. p. 97. This is a tall and very beautiful tree, with a straight, smooth trunk, and branches nearly horizontal. The bark is of a gray colour, compact, heavy, and highly resinous; and has the aromatic flavour of the balsam. The leaves are alternate, and composed of two, three, four, and sometimes five pairs of leaflets, which are nearly opposite, ovate lanceolate, with a lengthened but somewhat blunt and emarginate apex, entire, smooth and shining, hairy on the under surface, marked with numerous transparent points, and placed on short footstalks. Many leaves terminate unequally, consisting of five, six, or nine leaflets. The common petioles are rather thick, and hairy. The flowers are white or rose-coloured, and disposed in axillary racemes, longer than the leaves. The fruit is a pendulous, straw-coloured legume, club-shaped, somewhat curved, terminating in the curved style, and globular near the extremity, where there is a single cell, containing a crescent-shaped seed.

The tree is a native of the warmer regions of South America, growing in various parts of Peru and New Granada, where it is called *quinquino* by the natives. The wood is employed in building, and is valuable for its durability. The bark and fruit are used to perfume apartments. The tree yields by incision a balsamic juice, which, when received in bottles, may be preserved in a liquid state for some years. This is called *white liquid balsam.* When this juice is deposited in mats or calabashes, as is commonly done in Carthagena and the mountains of Tolu, it becomes concrete, and acquires the name of *dry white balsam*, or *balsam of Tolu*, by which it is known in the shops. By boiling the bark in water. a dark coloured liquid is procured, which retains its fluid consistence, and is called *black Peruvian balsam.* According to Ruiz, from whose account the above details were derived, "there is no difference in these three balsams, excepting in the name, colour, and consistence." It is only the dark coloured liquid that is known with us by the name of *balsam of Peru*, and to this the following remarks are confined.

In stating that it is procured by boiling the bark in water, Ruiz does not speak from his own knowledge. A general opinion is, that it is prepared by decoction from the smaller branches. As brought into the United States, it is usually in tin canisters, with a whitish scum upon its surface, and more or less deposite, which, however, is dissolved with the aid of heat.

In a recent communication by M. Guibourt to the Society of Pharmacy at Paris, it is stated, on the authority of M. Bazire, that a product exactly resembling the dark coloured Peruvian balsam of commerce is collected largely in Guatemala, and thence sent to Peru. It is obtained from a tree belonging to the genus *Myrospermum* of Jacquin—*Myroxylon* of Linnæus—but specifically different from the *M. Peruiferum.*

Properties. Balsam of Peru is viscid like syrup or honey, of a dark reddish-brown colour, a fragrant odour, and a warm bitterish taste, leaving when swallowed a burning or prickling sensation in the throat. Its sp. gr. is from 1.14 to 1.15. When exposed to flame it takes fire, diffusing a white smoke, and a fragrant odour. Consisting chiefly of resin, essential oil, and benzoic acid, it is properly considered a balsam, though probably altered by heat. Alcohol in large proportion entirely dissolves it. Boiling water extracts the benzoic acid. From 1000 parts of the balsam, Stoltze obtained 24 parts of a brown nearly insoluble resinous matter, 207 of resin readily soluble, 690 of oil, 64 of benzoic acid, 6 of extractive matter, and a small proportion of water. The oil he considers to be of a peculiar nature, differing from the volatile, the fixed, and the empyreumatic oils.

Medical Properties and Uses. This balsam is a warm stimulating tonic and expectorant; and has been recommended in chronic catarrhs, certain forms of asthma, phthisis, and other pectoral complaints attended with debility. It has also been used in gonorrhœa, leucorrhœa, amenorrhœa, chronic rheumatism, and palsy. At present, however, it is little employed by American physicians. As an external application it has been found beneficial in chronic indolent ulcers. The dose is half a fluidrachm. It is best administered diffused in water by means of sugar and the yolk of eggs or gum Arabic. W.

MYRRHA. *U.S., Lond., Ed., Dub.*

Myrrh.

"Balsamodendron myrrha. Succus concretus. *The concrete juice.*" *U.S.*
Myrrhe, *Fr., Germ.;* Mirra, *Ital., Span.;* Murr, *Arab.;* Bowl, *Hindoost.*

Though myrrh has been employed from the earliest periods of history, the plant which yields it has not been certainly known till a very recent period. The *Amyris Kataf* of Forskhal, seen by that traveller in Arabia, was supposed by him to be the myrrh tree, but without sufficient evidence. More recently Ehrenberg, a German traveller, met on the frontiers of Arabia Felix with a plant, from the bark of which he collected a gum-resin precisely similar to the myrrh of commerce. From specimens of the plant taken by Ehrenberg to Germany, Nees of Esenbeck referred it to the genus Balsamodendron of Kunth, and named it *Balsamodendron Myrrha.* This genus was formed by Kunth from the *Amyris*, and includes the *Amyris Kataf* of Forskhal, which may possibly also produce a variety of myrrh. The new genus differs from the *Amyris*, chiefly in having the stamens beneath instead of upon the germ. It is not thought by De Candolle sufficiently distinct. For the generic character of Amyris, see *Elemi.*

Balsamodendron Myrrha. Fée, *Cours d' Hist. Nat. Pharm.* i. 641. This is a small tree, with a stunted trunk, covered with a whitish-gray bark, and furnished with rough abortive branches terminating in spines. The leaves are ternate, consisting of obovate, blunt, smooth, obtusely denticulate leaflets, of which the two lateral are much smaller than that at the end. The fruit is oval lanceolate, pointed, longitudinally furrowed, of a brown colour, and surrounded at its base by the persistent calyx. The tree grows in Arabia Felix, in the neighbourhood of Gison, in dwarfish thickets, interspersed among the Acaciæ and Euphorbiæ. The juice exudes spontaneously, and concretes upon the bark.

Two varieties of myrrh are distinguished in the market—the *India* and the *Turkey myrrh*—the former imported from the East Indies, the latter from the Levant. It is said that the India myrrh is collected in Abyssinia, and thence taken to the ports of Hindostan, while that which goes under the name of Turkey myrrh, is brought from Arabia by the route of Egypt.

Properties. Myrrh is in small irregular fragments somewhat like tears, or in larger masses composed apparently of agglutinated portions differing somewhat in their shade of colour. When of good quality, it is reddish-yellow and translucent, of a strong peculiar somewhat fragrant odour, and a bitter aromatic taste. It is brittle and pulverizable, presenting, when broken, a shining surface, which in the larger masses is very irregular. Under the teeth it is at first friable, but soon softens and becomes adhesive. It is inflammable, but does not burn vigorously; and is not fusible by heat. Its specific gravity is stated at 1.36. Turkey myrrh, to the best of which the above description is applicable, generally much excels in quality that imported from the East Indies. The latter is much darker, more opaque, less odorous, and often abounds with impurities. We have seen pieces of India myrrh enclosing large crystals of common salt, as if the juice might have fallen from the tree and concreted upon the ground, where this mineral abounds. Is not this fact confirmatory of the statement, that the India myrrh is partly at least brought originally from Abyssinia, where we know that salt exists abundantly in some places upon the surface of the earth?

Myrrh is partially soluble in water, alcohol, and ether. Triturated with water it forms an opaque yellowish solution, which deposites the larger portion of the myrrh upon standing. The alcoholic tincture is rendered opaque by the addition of water, but throws down no precipitate. According to Neumann, alcohol and water severally extract the whole of its odour and taste. By distillation a volatile oil rises, having the peculiar flavour of myrrh, and leaving the residue in the retort simply bitter. The gum-resin is soluble in the liquid alkalies, and when triturated with them in a crystalline state forms a tenacious liquid. Braconnot found 23 parts of an odorous bitter resin, and 77 of a peculiar gummy substance in the hundred. (*Fée Hist. Nat. Pharm.*) Pelletier gives as the result of his analysis, 34 per cent. of resin, with a small proportion of volatile oil, and 66 per cent. of gum. According to Brandes, it contains in one hundred parts, 2.60 of volatile oil, 22.24 of a soft, bitter resin, soluble in ether, 5.56 of a tasteless resin, insoluble in ether, 54.38 of gum with traces of various salts, 9.30 of tragacanthin (bassorin), besides salts of potassa and lime, water, and impurities.

Medical Properties and Uses. Myrrh is a stimulant tonic, with some tendency to the lungs, and perhaps to the uterus. Hence it is employed as an expectorant and emmenagogue, in debilitated states of the system, in the absence of febrile excitement or acute inflammation. The complaints in which it is usually administered are chronic catarrh, phthisis pulmonalis, humoral asthma, other pectoral affections in which the secretion of mucus is abundant but not easily expectorated, chlorosis, amenorrhœa, and the various affections connected with this state of the uterine function. It is generally given combined with the chalybeates or other tonics, and in amenorrhœa, very frequently with aloes. It is used also as a local application to spongy gums, the aphthous sore mouth of children, and various kinds of unhealthy ulcers. The dose is from ten to thirty grains, and may be given in the form of powder or pill, or suspended in water, as in the famous antihectic mixture of Dr. Griffith, which has been introduced into the Pharmacopœias with the title of *Mistura Ferri Composita.* The watery infusion is also sometimes given, and an aqueous extract has been recommended as milder than the medicine in substance. The tincture is used chiefly as an external application.

Off. Prep. Decoct. Aloës Comp., *Dub.;* Mistura Ferri Comp., *U.S., Lond., Dub.;* Pil. Aloës et Myrrhæ *U.S., Lond., Ed., Dub.;* Pil Assæfœtid. Comp., *Ed.;* Pil. Ferri Comp., *U.S., Lond., Dub.;* Pil. Galbani Comp., *Lond., Dub.;* Pil. Rhei Comp., *U.S., Ed.;* Tinct. Aloës Æetherea, *Ed.;* Tinct. Aloës et Myrrhæ, *Ed.;* Tinct. Myrrhæ, *U.S., Lond., Ed., Dub.* W.

◆

NUX VOMICA. *U.S. Dub.*

Nux Vomica.

"Strychnos nux vomica. Semina. *The seeds.*" *U. S.*

Noix vomique, *Fr.;* Krähenaugen, Brechnüsse, *Germ.;* Noce vomica, *Ital.;* Nuez vomica, *Span.*

STRYCHNOS. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Apocyneæ.

Gen. Ch. *Corolla* five-cleft. *Berry* one-celled, with a ligneous rind. *Willd.*

Strychnos Nux Vomica. Willd. *Sp. Plant.* i. 1052; Woodv. *Med. Bot.* p. 222. t. 79. This tree is of a moderate size, with numerous strong branches covered with a smooth, dark gray bark. The young branches are long, flexuous, very smooth, dark green, and furnished with oval roundish, entire, smooth, and shining leaves, having three or five ribs, and placed opposite to each other on short footstalks. The flowers are small, white, funnel-shaped, and disposed in terminal corymbs. The fruit is a round berry, about as large as an orange, covered with a smooth, yellow, or orange-coloured, hard, fragile rind, and containing numerous seeds embedded in a juicy pulp.

The tree is a native of the East Indies, growing in Malabar, on the coast of Coromandel, in Ceylon, in numerous islands of the Indian Archipelago, in Cochin China, and other neighbouring countries. The wood and the root are very bitter, and employed in the East Indies for the cure of intermittents. The *radices colubrinæ*, and *lignum colubrinum*, of the older writers, which have been long known in Europe as narcotic poisons, are ascribed by some writers to this species of Strychnos, under the impression that it is identical with the *S. Colubrina*, to which Linnæus refers them. They have been ascertained by Pelletier and Caventou to contain a large quantity of strychnia. The only officinal portion of the plant is the seeds, and to these it is that the title of nux vomica is applied.

They are flat, circular, about three quarters of an inch in diameter, and two or three lines in thickness, generally somewhat curved, with a depression on one side, and a corresponding prominence on the other. They are thickly covered with fine, silky, shining, ash-coloured or yellowish-gray hairs, attached to a thin fragile coating, which closely invests the interior nucleus or kernel. This is very hard, horny, usually whitish and semitransparent, sometimes dark coloured and opaque, and of very difficult pulverization. The seeds are destitute of odour, but have an acrid very bitter taste, which is much stronger in the kernel than in the investing membrane. They impart their virtues to water, but more readily to diluted alcohol. Nux vomica has been analyzed by several chemists, but most accurately by Pelletier and Caventou, who discovered in it two alkaline principles, *strychnia* and *brucia*, united with a peculiar acid which they named *igasuric*. Its other constituents are a yellow colouring matter, a concrete oil, gum, starch, bassorin, a small quantity of wax, and, according to M. Corriol, zumic acid. Strychnia and brucia are its active principles, and as they have been employed in the separate state, deserve a particular consideration.

Strychnia was discovered by Pelletier and Caventou, A.D. 1818, both in the nux vomica and bean of St. Ignatius, and received its name from the generic title of the plants (*Strychnos*), to which these two products belong. According to these chemists, it exists much more abundantly in the bean of St. Ignatius than in the nux vomica, the former yielding 1.2 per cent., the latter only 0.4 per cent. of the alkali. Pure strychnia crystallizes in quadrilateral prisms, terminated by quadrilateral pyramids. Rapidly crystallized, it is in the form of a white granular powder. It is permanent in the air, inodorous, but excessively bitter, with a metallic after taste. So intense is the bitterness, that one part of strychnia communicates a sensible taste to 600,000 parts of water. It is neither volatile nor fusible, being melted by heat only at the moment of decomposition, which takes place, however, at a comparatively low temperature. It is soluble in 6667 parts of water at 50°, and about 2500 parts at the boiling point. Alcohol and the volatile oils dissolve it freely, ether very sparingly. The acids unite with it to form crystallizable salts. Its ultimate constituents are carbon, nitrogen, hydrogen, and oxygen. It may be obtained by the following process.

Prepare a decoction of nux vomica previously rasped, or what is better, boil the alcoholic extract in water. Treat the solution with an excess of subacetate of lead, which precipitates various foreign matters, leaving the strychnia and brucia dissolved. Throw down the excess of lead by hydrosulphuric acid (*sulphuretted hydrogen*); filter the solution; boil it in order to expel the excess of hydrosulphuric acid; then boil with magnesia, which decomposes the salts of strychnia and brucia, and precipitates these alkalies mingled with the excess of magnesia. Collect the precipitate on a filter, wash it with cold water, and treat it with boiling alcohol, which dissolves the vegetable alkalies, leaving the magnesia. Filter the liquor while still hot, and evaporate it to dryness. A mixture of strychnia, brucia, and colouring matter is thus obtained. Treat the mixture with cold dilute alcohol, which dissolves the brucia and colouring matter, leaving the strychnia in the form of a powder. This may be purified by dissolving it in boiling rectified alcohol, which on cooling deposites the strychnia, and yields still more by evaporation; while a small quantity of brucia which had escaped the weak alcohol, remains in the mother liquor. To purify it still further it may be dissolved in a diluted acid, the saline solution treated with animal charcoal, and precipitated by an alkali; and the precipitated strychnia washed, dissolved in alcohol, and obtained in a crystalline state by evaporation.

The salts of strychnia are very soluble, intensely bitter, and powerful in their action on the system. They are precipitated from their solutions by tannin. The sulphate is sometimes employed. It is soluble in less than six times its weight of cold water, and consists of 9.5 parts of acid and 90.5 of base in the hundred. The mineral acids, acetic, tartaric, and citric acids, added to strychnia, render it more soluble, and therefore more energetic in its action on the system.

Strychnia is, from its high price, very liable to be adulterated. It should be entirely soluble in alcohol and the diluted acids, and should leave no residue when submitted to a calcining heat, with access of air. Magnesia and phosphate of lime are said to be among the most frequent adulterations. When entirely pure, it is not reddened by nitric acid; but a very small proportion of brucia, which can hardly be considered as an adulteration, is sufficient to impart this property. Robiquet states that all adulterations may be avoided by purchasing strychnia in the crystallized state. (*Journ. of Phil. Col. of Pharm.* vi. 232.)

Brucia was discovered by Pelletier and Caventou, first in the bark called *false Angustura*, (see *Angustura*,) and subsequently, associated with strychnia, in the nux vomica and bean of Saint Ignatius. It is crystallizable; without smell, but of a permanent, harsh very bitter taste; soluble in 850 parts of cold, and 500 of boiling water; and very soluble in alcohol, whether hot or cold. It is permanent in the air, but melts at a temperature a little above that of boiling water, and on cooling congeals into a mass resembling wax. It forms crystallizable salts with the acids. Concentrated nitric acid produces with brucia or its salts an intense crimson colour, which changes to yellow by heat, and upon the addition of protomuriate of tin becomes violet. These effects are peculiar to brucia, and if produced with strychnia, evince the presence of the former alkali. Brucia is analogous in its operation to strychnia, but possesses, according to M. Andral, jun., only about one-twelfth of its strength, when the latter principle is entirely pure. It is therefore seldom employed; and it is unnecessary to insert a process for its preparation. It is sufficient to observe, that it may be procured from false Angustura bark, in a manner essentially the same with that in which strychnia is procured from the nux vomica, with this difference, that the alcoholic extract obtained from the magnesian precipitate should be treated with oxalic acid, and subsequently with a mixture of rectified alcohol and ether, which take up the colouring matter, leaving the oxalate of brucia. This is decomposed by magnesia, and the brucia separated by alcohol, which, by spontaneous evaporation, yields it in the state of crystals.

Medical Properties and Uses. Nux vomica is very peculiar in its operation upon the system. It appears to be chiefly directed to the nerves of motion, probably through the medium of the spinal marrow. When given in a quantity sufficient to bring the system under its influence, it produces involuntary contractions of the muscles, which are usually of that permanently rigid character which we observe in tetanus; but at the same time there occur frequent and sometimes violent starts or muscular spasms, alternating with intervals of relaxation, as if the patient had received a shock of electricity. A sense of heat in the stomach, constriction of the abdomen, tightness of the chest, and retention of urine are also frequently experienced, to a greater or less extent, according to the quantity of the medicine administered. Given to the inferior animals in fatal doses it produces great anxiety, difficult and confined breathing, retching to vomit, universal tremors, spasmodic action of the muscles, and ultimately violent convulsions. Death is supposed to take place from a suspension of respiration, resulting from a spasmodic constriction of the muscles concerned in the process. Upon dissection, no traces of inflammatory action are observable, unless large quantities of the nux vomica have been swallowed, when the stomach appears inflamed. A division of the spinal marrow near the occiput, does not prevent the peculiar effects of the medicine, so that the intervention of the brain is not essential to its action. That it enters the circulation and is brought into contact with the parts upon which it acts, is rendered evident by the experiments of Magendie and others.

It has long been employed in India, and was known as a medicine to the Arabian physicians. On the continent of Europe it has at various times been recommended as an antidote to the plague, and as a remedy in intermittents, worms, mania, hypochondriasis, hysteria, rheumatism, hydrophobia, and dysentery; but in none of these complaints is it now much employed. It is said to have effectually cured obstinate spasmodic asthma. Its peculiar influence upon the nerves of motion, to which the public attention was first called by Magendie, suggested to M. Fouquier, a French physician, the application of the remedy to paralytic affections; and his success was such as to induce him to communicate to the public the result of his experience. Others have subsequently employed it with variable success; but the experience in its favour so much predominates, that it may now be considered a standard remedy in palsy. It is a singular fact, attested by numerous witnesses, that its action is directed more especially to the paralytic part, exciting contraction in this before it is extended to other muscles. The medicine, however, should be administered with judgment, and never given in cases depending on inflammation or organic lesion of the brain or spinal marrow, until after the removal of the primary affection by bleeding or other depletory measures. It has been found more successful in general palsy and paraplegia than in hemiplegia, and has frequently effected cures in palsy of the bladder, incontinence of urine from paralysis of the sphincter, in amaurosis, and other cases of partial palsy.

Nux vomica may be given in powder in the dose of five grains, repeated three or four times a day, and gradually increased till its effects are experienced. In this form, however, it is very uncertain; and fifty grains have been given with little or no effect. It is most readily reduced to powder by filing or grating; and the raspings may be rendered finer by first steaming them, then drying them by stove heat, and lastly rubbing them in a mortar.

The alcoholic extract is more convenient and more certain in its operation. From half a grain to two grains may be given in the form of pill, repeated as before, and gradually increased. (See *Extractum Nucis Vomicæ.*) The watery extract is comparatively feeble.

Strychnia has recently been much used, and possesses the advantage of greater certainty and uniformity of action. Its effects are precisely similar. With the exception of prussic acid, it is perhaps the most violent poison with which we are acquainted, and should therefore be administered with great caution. Dr. Bardsley bears very decided testimony to its favourable effects in palsy. He gave it in thirty-five cases, of which twenty-two were hemiplegia, and thirteen paraplegia; of the former, twelve were cured and eight considerably relieved; of the latter, eleven were cured and one relieved. The duration of the treatment was from six weeks or less to three months. Strychnia has also been highly recommended in the palsy resulting from the poisonous action of lead. The dose is from one-twelfth to one-sixth of a grain, repeated twice or three times a day, and gradually increased. Dr. Bardsley began with one-sixth of a grain, and seldom increased the dose to half a grain, three times a day, without producing spasmodic symptoms. The system is not so soon habituated to its impression as to that of the narcotics generally, so that after its effects are experienced it is unnecessary to go on increasing the dose.

Strychnia has been applied externally with advantage in amaurosis. It should be sprinkled upon a blistered surface near the temples, in the quantity of half a grain or a grain morning and evening, and the quantity may be gradually augmented. It has also been given internally with favourable results in the same complaint. The best form of administration is that of pill, in consequence of the excessive bitterness of the solution. Strychnia may, however, be given, dissolved in alcohol, or in water by the intervention of an acid.

Brucia may be used for the same purposes with strychnia in the dose of one grain twice or three times a day. Dr. Bardsley found that the quantity of two grains three or four times a day, was seldom exceeded without the occurrence of the characteristic effects of the medicine. Magendie has found this alkali very useful in small doses as a tonic. He employed for this purpose, one-eighth of a grain, frequently repeated.

Off. Prep. Extractum Nucis Vomicæ, *Dub.* W.

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OLEA.

Oils.

These are liquid or solid substances, characterized by an unctuous feel, inflammability, and the property of leaving a greasy stain upon paper. They are divided into two classes, the *fixed* and *volatile*, distinguished, as their names imply, by their different habitudes in relation to the vaporizing influence of caloric.

1. OLEA FIXA. *Fixed Oils.*

The oils thus designated by the Edinburgh Pharmacopœia, are less correctly termed Olea expressa, *expressed oils*, by the London and Dublin Colleges; for they are not obtained exclusively by expression; and this process is sometimes employed in procuring the volatile oils. They are not designated as a class in the United States Pharmacopœia.

The fixed oils, though existing in greater or less proportion in various parts of plants, are furnished for use exclusively by the fruit; and, as a general rule, are most abundant in the dicotyledonous seeds. They are obtained either by submitting the bruised seeds to pressure in hempen bags, or by boiling them in water, and skimming off the oil as it rises to the surface. When pressure is employed, it is customary to prepare the seeds for the press, by exposing them to a moderate heat, so as to render the oil more liquid, and thus enable it to flow out more readily.

The consistence of the fixed oils varies from that of tallow to perfect fluidity; but by far the greater number are liquid at ordinary temperatures. They are somewhat viscid, transparent, and usually of a yellowish colour, which disappears when they are treated with animal charcoal. When pure they have little taste or smell. They are lighter than water, varying in specific gravity from 0.913 to 0.936. (*Berzelius.*) They differ very much in their point of congelation, olive oil becoming solid a little above 32° F., while linseed oil remains fluid at 4° below zero. They are not volatilizable without decomposition. At about 600° they boil, and are converted into vapour, which, when condensed, is found to contain a large proportion of oleic and margaric acids together with benzoic acid, another volatile acid, and an empyreumatic oil. Exposed to a red heat, in close vessels, they yield, among other products of the destructive distillation of vegetables, a large quantity of the combustible compounds of carbon and hydrogen. Heated in the open air they take fire, burning with a bright flame, and producing water and carbonic acid. When kept in air-tight vessels, they remain unchanged for a great length of time; but exposed to the atmosphere, they attract oxygen, and ultimately become concrete. Some, in drying, lose their unctuous feel, and are converted into a transparent, yellowish, flexible solid. These are called drying oils. Others, especially such as contain mucilaginous impurities, become rancid, acquiring a sharp taste and unpleasant smell. This change is owing to the formation of an acid, from which the oil may be freed by boiling it for a short time with hydrate of magnesia and water. The fixed oils are insoluble in water, but are miscible with that fluid by means of mucilage, forming mixtures which are called emulsions. They are in general very sparingly soluble in alcohol, but readily dissolved by ether, which serves to separate them from other vegetable proximate principles. By the aid of heat they dissolve sulphur and phosphorus. Chlorine and iodine are converted by them into muriatic and hydriodic acids, which reacting upon the oils increase their consistence, and ultimately render them as hard as wax. The stronger acids decompose them, giving rise, among other products, to the oleic and margaric acids. Boiled with diluted nitric acid, they are converted into malic and oxalic acids, besides other substances usually resulting from the action of this acid upon vegetable matter. Several acids are dissolved by them without producing any sensible change. They combine with salifiable bases; but at the moment of combination undergo a change, by which they are converted into a peculiar substance, called glycerin, and into the oleic, margaric, and perhaps stearic acids, which unite with the base employed. The compounds of these acids with potassa and soda are called soaps. (See *Sapo* and *Emplastrum Plumbi.*) The fixed oils dissolve many of the vegetable alkalies, the volatile oils, resin, and other proximate principles of plants. They have been ascertained by Chevreul to consist of two distinct substances, one of which is liquid at ordinary temperatures, and therefore called *elaïn*, (from ελαιον, oil,) the other solid, and called *stearin*, (from στέαρ, suet). These are found equally in animal oils; and the mode of obtaining them, with their distinctive properties, is treated of under the head of *Adeps*, to which the reader is referred. These principles, however, are not absolutely identical in the different oils, and have different points of congelation and liquefaction, according to the substance from which they are derived. (*Berzelius.*) The ultimate constituents of the fixed oils are carbon, hydrogen, and oxygen, the hydrogen being in much larger proportion than is necessary to form water with the oxygen. Those which are least fusible contain most carbon and least oxygen; and, according to Saussure, their solubility in alcohol is greater in proportion to their amount of oxygen. (*Berzelius.*) Some of them contain a very minute proportion of nitrogen.

2. OLEA VOLATILIA. *Volatile Oils.*

These are sometimes called *distilled oils*, from the mode in which they are usually procured; sometimes *essential oils*, from the circumstance that they possess, in a concentrated state, the properties of the plants from which they are derived. In the Pharmacopœias of the United States and London, the former title has been adopted; in that of Dublin, the latter; the Edinburgh College uses the term *volatile oils*.

They exist in all odoriferous vegetables, sometimes pervading the whole plant, sometimes confined to a single part; in some instances contained in distinct cellules, and preserved after desiccation, in others formed upon the surface, as in many flowers, and exhaled as soon as they are formed. Occasionally two or more are found in different parts of the same plant. Thus the orange tree produces one volatile oil in its leaves, another in its flowers, and a third in the rind of its fruit. In a few instances, when existing in distinct cellules, they may be obtained by pressure, as from the rind of the lemon and orange; but they are generally procured by distillation with water. (See *Olea Destillata.*)

The volatile oils are usually yellowish, but sometimes brown, red, green, or even blue, and occasionally colourless. They have a strong odour, resembling that of the plants from which they were procured, though generally less agreeable. Their taste is hot and pungent; and when they are diluted, is often gratefully aromatic. The greater number are lighter than water; some are heavier; and their sp. gr. varies from 0.847 to 1.17.* They partially rise in vapour at ordinary temperatures, diffusing their peculiar odour, and are completely volatilized by heat. Their boiling point is various, generally as high as 320° F. and sometimes higher; but most of them rise readily with the vapour of boiling water. When distilled alone, they almost always undergo partial decomposition. They differ also in their point of congelation. A few are solid at ordinary temperatures, several become so at 32° F., and many remain liquid considerably below this point. Heated in the open air, the volatile oils take fire, and burn with a bright flame, attended with much smoke. Exposed at ordinary temperatures, they absorb oxygen, assume a deeper colour, become thicker and less odorous, and are ultimately converted into resin. This change takes place most rapidly under the influence of light. Before the alteration is complete, the remaining portion of oil may be recovered by distillation.

The volatile oils are very slightly soluble in water. Agitated with this fluid they render it milky; but separate upon standing, leaving the water impregnated with their odour and taste. This impregnation is more complete when water is distilled with the oils, or from the plants containing them. Trituration with magnesia or its carbonate renders them much more soluble, probably in consequence of presenting, by their minute division, a more extensive surface to the action of the solvent. The intervention of sugar also greatly increases their solubility, and affords a convenient method of preparing them for internal use. Most of them are very soluble in alcohol, and in a degree proportionate to its freedom from water. The oils which contain no oxygen are scarcely soluble in diluted alcohol; and, according to Saussure, their solubility generally in this liquid is proportionate to the quantity of oxygen which they contain. They are readily dissolved by ether.

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* The oil of the *Gaultheria procumbens*, a native plant, is said to have the extraordinary sp. gr. of 1.17. *Journ. of the Phil. Col. of Pharm.* iii. 199.

The volatile oils dissolve sulphur and phosphorus with the aid of heat, and deposite them on cooling. By long boiling with sulphur they form brown, unctuous, fetid substances, formerly called *balsams of sulphur.* They absorb chlorine, which converts them into resin, and then combines with the resin. Iodine produces a similar effect. They are decomposed by the strong mineral acids, and unite with several of those from the vegetable kingdom. With the exception of the oil of cloves they do not combine directly with salifiable bases; but when treated with a caustic alkali, they are converted into resin, which unites with the alkali to form a kind of soap. Several of the metallic oxides, and various salts which easily part with oxygen, convert them into resin. The volatile oils dissolve many of the proximate principles of plants and animals; such as the fixed oils and fats, resin, camphor, and several of the vegetable alkalies.

The volatile, like the fixed oils, consist of distinct principles, which are congealed at different temperatures, and may be separated by compressing the frozen oil between the folds of bibulous paper. The solid matter remains within the folds; and the fluid is absorbed by the paper, from which it may be separated by distillation with water. The name of *stearoptene* has been proposed for the former, that of *eleoptene* for the latter. The solid crystalline substances deposited by certain volatile oils upon standing, usually considered as camphor, are examples of stearoptene. Some oils, under the influence of water, deposite crystalline bodies which appear to be hydrates of the respective oils.

The ultimate constituents of the volatile oils are usually carbon, hydrogen, and oxygen. Some, as the oils of turpentine and copaiba, in their purest state, contain only carbon and hydrogen. Several, according to De Saussure, have a very minute proportion of nitrogen in their composition.

The volatile oils are often sophisticated. Among the most common adulterations are fixed oils, resinous substances, and alcohol. The fixed oils may be discovered by the permanent stain which they leave on paper, while that occasioned by a pure volatile oil disappears entirely when exposed to heat. They may also in general be detected by their comparative insolubility in alcohol. Both the fixed oils and resins are left behind when the adulterated oil is distilled with water. If alcohol is present, the oil becomes milky when agitated with water, and after the separation of the liquids, the water occupies more space, and the oil less than before. The following method of detecting alcohol has been proposed by M. Beral. Put twelve drops of the suspected oil in a perfectly dry watch-glass, and add a piece of potassium about as large as the head of a pin. If the potassium remain for twelve or fifteen minutes in the midst of the liquid, there is either no alcohol present, or less than four per cent. If it disappear in five minutes, the oil contains more than four per cent. of alcohol; if in less than a minute, twenty-five per cent. or more. Sometimes oils of little value are mixed with those which are costly. The taste and smell afford in this case the best means of detecting the fraud. The specific gravity of the oils may also serve as a test of their purity. When oils of which one is lighter and one heavier than water, are mixed, they are separated by long agitation with this fluid, and will take a place corresponding to their respective specific gravities. But it sometimes happens that an unadulterated oil may thus be separated into two portions. When oil of turpentine is used as the adulteration, it may be known by remaining in part undissolved, when the mixture is treated with three or four times its volume of alcohol of the sp. gr. 0.84.

Volatile oils may be preserved without change in small well-stopped bottles, entirely filled with the oil, and excluded from the light. W.

OLEUM AMYGDALÆ. *U. S.*

Oil of Almonds.

"Amygdalus communis. Nucleorum oleum fixum. *The fixed oil of the kernels.*" *U. S.*

Off. Syn. OLEUM AMYGDALARUM, *Lond.*, *Dub.*; OLEUM AMYGDALI COMMUNIS, *Ed.*

Huile d'amandes, *Fr.*; Mandelöl, *Germ.*; Olio di mandorle, *Ital.*; Aceyte de almendras, *Span.*

See AMYGDALA.

This oil is obtained equally pure from sweet and bitter almonds. In its preparation, the almonds, after having been deprived of a reddish-brown powder adhering to their surface, by rubbing them together in a piece of coarse linen, are ground in a mill resembling a coffee-mill, or bruised in a stone mortar, and then submitted to pressure in canvass sacks between plates of iron slightly heated. The oil, which is at first turbid, is clarified by rest and filtration. The London College directs the oil to be prepared by macerating the almonds in cold water for twelve hours, bruising them, and then expressing without heat. The Edinburgh and Dublin Colleges employ the same process, omitting the previous maceration. Sometimes the almonds are steeped in very hot water, deprived of their cuticle, and dried in a stove previously to expression. The oil is thus obtained free from colour, but in no other respect better. Bitter almonds, when treated in this way, are said to impart a smell of hydrocyanic acid to the oil. With regard to these, therefore, the process is objectionable. M. Boullay obtained fifty-four per cent. of oil from sweet almonds, Vogel twenty-eight per cent. from bitter almonds.

The oil of almonds is clear and colourless, or slightly tinged of a greenish-yellow, is nearly inodorous, and has a bland sweetish taste. It remains liquid at temperatures considerably below the freezing point of water. Its sp. gr. is from 0.917 to 0.92.

It may be used for the same purposes with olive oil; and when suspended in water by means of mucilage or the yolk of eggs and loaf sugar, forms a very pleasant emulsion, useful in catarrhal and other pulmonary affections attended with cough. From a fluidrachm to a fluidounce may be given at a dose.

Off. Prep. Unguentum Aquæ Rosæ, *U. S.* W.

OLEUM BUBULUM. *U.S.*

Neats-foot Oil.

"Bos domesticus. Oleum ex ossibus præparatum. *The oil prepared from the bones.*" *U.S.*

Huile de pied de bœuf, *Fr.;* Ochsenfussefett, *Germ.*

Neats-foot oil is obtained by boiling in water for a long time the feet of the ox, previously deprived of their hoof. The fat and oil which rise to the surface are removed, and introduced into a fresh portion of water heated nearly to the boiling point. The impurities having subsided, the oil is drawn off, and if required to be very pure, is again introduced into water, which is kept for twenty-four hours sufficiently warm to enable the fat which is mixed with the oil to separate from it. The liquid being then allowed to cool, the fat concretes, and the oil is removed and strained, or filtered through layers of small fragments of charcoal free from powder.

This oil is yellowish, and when properly prepared, inodorous and of a bland taste. It thickens or congeals with great difficulty, and is therefore very useful for greasing machinery in order to prevent friction.

It was introduced into the officinal catalogue of the United States Pharmacopœia as an ingredient of the ointment of nitrate of mercury.

Off. Prep. Unguentum Hydrargyri Nitratis, *U.S.* W.

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OLEUM CAJUPUTI. *U.S. Secondary.*

Cajuput Oil.

"Melaleuca cajuputi. Oleum volatile. *The volatile oil.*" *U.S.*

Off. Syn. CAJUPUTI OLEUM. Melaleuca Cajuputi. Oleum essentiale. *Lond.;* MELALEUCÆ LEUCADENDRI OLEUM VOLATILE. *Ed.;* MELALEUCA LEUCADENDRON. Oleum volatile Cajeput. *Dub.*

Huile de cajéput, *Fr.;* Kajeputöl, *Germ.;* Olio di cajeput, *Ital.;* Kayuputieh, *Malay.*

Melaleuca. *Sex. Syst.* Polyadelphia Icosandria.—*Nat. Ord.* Myrtaceæ.

Gen. Ch. *Calyx* five-parted, semi-superior. *Corolla* five-petalled. *Stamens* about forty-five, very long, conjoined in five bodies. *Style* single. *Capsule* three-celled. *Seeds* numerous. *Roxburgh.*

It was long supposed that the oil of cajuput was derived from the *Melaleuca leucadendron;* but from specimens of the plant which really yields this medicine, sent from the Moluccas and cultivated in the botanical garden of Calcutta, it appears to be a distinct species, upon which the trivial name of *Cajuputi* has been conferred. It corresponds with the *arbor alba minor* of Rumphius, and is a smaller plant than the *M. leucadendron.*

Melaleuca Cajuputi. Rumphius, *Herbar. Amboinense,* tom. ii. tab. 17; Roxburgh, *Trans. Lond. Med. Bot. Soc.,* A. D., 1829; *Journ. of the Phil. Col. of Pharm.,* vol. i. p. 193. This is a small tree, with an erect but crooked stem, and scattered branches, the slender twigs of which droop like those of the weeping willow. The bark is of a whitish-ash colour, very thick, soft, spongy, and lamellated, throwing off its exterior layer from time to time in flakes, like the birch tree. The leaves have short footstalks; are alternate, lanceolate, when young sericeous, when full grown smooth, deep green, three and five-nerved, slightly falcate, entire, from three to five inches long, from one half to three quarters of an inch broad; and when bruised exhale a strong aromatic odour. The flowers, which are small, white, inodorous, and sessile, are disposed in terminal and axillary downy spikes, with solitary, lanceolate, three-flowered bractes. The filaments are three or four times longer than the petals, and both are inserted in the rim of the calyx.

This species of Melaleuca is a native of the Moluccas, and other neighbouring islands. The oil is obtained from the leaves by distillation. It is prepared chiefly in Amboyna and Bouro, and is exported from the East Indies in glass bottles. The small proportion yielded by the leaves, and the extensive use made of it in India, render it very costly.

Properties. Cajuput oil is very fluid, transparent, of a fine bluish-green colour, a lively and penetrating odour analogous to that of camphor, and a warm pungent taste. It is very volatile, lighter than water, (of the sp. gr. 0.978 at 48°,) and burns without any residue. The green colour is ascribed by some writers to the presence of a salt of copper derived from the vessels in which the distillation is performed; but neither Brande nor Gœrtner could detect copper by chemical reagents. M. Lesson, who witnessed the process for preparing the oil at Bouro, attributes its colour to chlorophylle, or some analogous principle, and states that it is rendered colourless by rectification. Guibourt, moreover, obtained a green oil by distilling the leaves of a Melaleuca cultivated at Paris.

The high price of cajuput oil has led to its occasional adulteration. The oil of rosemary, or that of turpentine, impregnated with camphor, and coloured with the resin of milfoil, is said to be employed for the purpose.

Medical Properties and Uses. This oil is highly stimulant, producing when swallowed a sense of heat, with an increased fulness and frequency of pulse, and exciting in some instances profuse perspiration. It is very highly esteemed by the Malays and other people of the East, who consider it a universal panacea. (*Lesson, Journ. de Chim. Med.* 1827.) They are said to employ it with great success in epilepsy and palsy. (*Ainslie.*) The complaints to which it is best adapted are probably chronic rheumatism, and spasmodic affections of the stomach and bowels, unconnected with inflammation. It has been highly extolled as a remedy in spasmodic cholera. Diluted with an equal proportion of olive oil, it is applied externally to relieve gouty and rheumatic pains. Like most other highly stimulating essential oils, it relieves toothach, if introduced into the hollow of the carious tooth. It is little used in the United States. The dose is from one to five drops, given in emulsion, or upon a lump of sugar. W.

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OLEUM CARYOPHYLLI. *U.S.*

Oil of Cloves.

"Eugenia caryophyllata. Gemmarum floralium oleum volatile. *The volatile oil of the flower-buds.*" *U.S.*

Off. Syn. CARYOPHYLLORUM OLEUM. *Lond.;* EUGENIÆ CARYOPHYLLATÆ OLEUM VOLATILE. Ex floribus nondum explicitis. *Ed.;* EUGENIA CARYOPHYLLATA. Oleum volatile. *Dub.*

Huile de girofle, *Fr.;* Nelkenöl, *Germ.;* Olio di garofani, *Ital.;* Aceyte de clavos *Span.*

See CARYOPHYLLUS.

This oil is obtained by distilling cloves with water, to which it is customary to add common salt, in order to raise the temperature of ebullition; and the water should be repeatedly distilled from the same cloves, in order completely to exhaust them. The product of good cloves is said to be about one-sixth of their weight. The oil was formerly brought from Holland or the East Indies; but since the introduction of the Cayenne cloves into our markets, the reduced price and superior freshness of the drug have rendered the distillation of oil of cloves profitable in this country; and the best now sold is of domestic extraction. We have been informed that from seven to nine pounds of cloves yield to our distillers about one pound of the oil.

Properties. Oil of cloves, when recently distilled, is very fluid, clear, and colourless, but becomes yellowish by exposure, and ultimately brown. As found in our shops it is frequently of a reddish-brown colour, answering in appearance to the oil described by Lewis, and after him by other British writers on the Materia Medica, as derived from the Dutch. In the properties of taste and smell, the oil resembles cloves, but is comparatively less pungent. The taste of the Dutch oil of cloves is more pungent and fiery than that freshly obtained by distillation, owing, as is supposed, to the presence of a portion of the resin. The sp. gr. of the oil, according to Bonastre, is 1.061. It is one of the least volatile of the essential oils, and requires for congelation a temperature from zero of Fahrenheit to —4°. It is completely soluble in alcohol, ether, and strong acetic acid. Nitric acid changes its colour to a deep red, and converts it by the aid of heat into oxalic acid. It combines directly with the mineral alkalies, forming soluble and crystallizable compounds. When long kept it deposites a crystalline *stearoptene.* It is frequently adulterated with fixed oils, and sometimes also with oil of pimento and with copaiba. The oil of cloves should sink in pure water.

Medical Properties and Uses. Its medical effects are similar to those of cloves, and it is used for the same purposes; but its most common employment is as a corrigent of other medicines. Like other powerful irritants it is sometimes effectual in relieving toothach, when introduced into the cavity of a carious tooth. The dose is from two six minims.

Off. Prep. Alcohol Ammoniatum Aromaticum, *U.S.;* Confectio Scammonii, *U.S.;* Pilulæ Colocynthidis Compositæ, *Ed.*, *Dub.* W.

OLEUM CINNAMOMI. *U.S.*

Oil of Cinnamon.

"Laurus cinnamomum. Corticis oleum volatile. *The volatile oil of the bark.*" *U.S.*

Off. Syn. CINNAMOMI OLEUM. *Lond.;* LAURUS CINNAMOMUM. Oleum volatile. *Dub.*

Huile de cannelle, *Fr.;* Zimmtöl, *Germ.;* Olio di cannella, *Ital.;* Aceyte de canela, *Span.*

See CINNAMOMUM.

This oil is prepared exclusively in the East. In Ceylon, the cinnamon which was not considered of sufficiently good quality for the East India Company's investment, was formerly appropriated to this purpose. The following account of the method of extraction is given by Marshall. The bark, having been coarsely powdered, is macerated for two days in sea-water, and then submitted to distillation. A light and a heavy oil come over with the water, the former of which separates in a few hours, and swims upon the surface, the latter falls to the bottom of the receiver, and continues to be precipitated for ten or twelve days. In future distillations the saturated cinnamon water is employed in connexion with sea-water to macerate the cinnamon. Eighty pounds of the bark freshly prepared yield about two and a half ounces of the lighter oil, and five and a half of the heavier. From the same quantity of cinnamon which has been kept for several years in store, about half an ounce less of each oil is obtained. The two kinds are probably united in the oil of commerce. An oil is also distilled from the Chinese cinnamon or commercial cassia; but is inferior in flavour to that afforded by the aromatic of Ceylon, and commands a much smaller price. It is called *oil of cassia.* The two are said to be frequently mixed together.

Recently prepared oil of cinnamon is of a light yellow colour, which becomes deeper by age, and ultimately reddish. It has the flavour of cinnamon in a concentrated state. When applied undiluted to the tongue it is excessively hot and pungent. Dr. Duncan states that it sometimes has a peppery taste, which he ascribes to an admixture of the leaves with the bark in the preparation of the oil. It is heavier than water, having the specific gravity 1.035. It congeals below the freezing point of water, and reassumes the liquid form at 41° F. Alcohol completely dissolves it; and as it does not rise in any considerable quantity at the boiling temperature of this liquid, it may be obtained by forming a tincture of cinnamon, and distilling off the menstruum. When very long kept it deposites a *stearoptene* in large, regular, colourless or yellowish crystals. According to Dumas and Péligot, this is a compound of the pure oil with oxygen, and possesses acid properties analogous to those of benzoic acid. They propose to call it cinnamic acid. (*Journ. de Pharm.* xx. 546.) The oil of cinnamon is said to be frequently adulterated with alcohol and fixed oil.

Medical Properties and Uses. It has the cordial and carminative properties of the cinnamon, without its astringency; and is much employed as an adjuvant to other medicines, the taste of which it corrects or conceals, while it conciliates the stomach. As a powerful local stimulant, it is sometimes prescribed in gastrodynia, flatulent colic, and languor from gastric debility. The dose is one or two minims, and may be most conveniently administered in the form of emulsion.

Off. Prep. Alcohol Ammoniatum Aromaticum, *U.S.;* Aqua Cinnamomi, *U.S.;* Spiritus Cinnamomi, *Lond.* W.

◆

COCI BUTYRACEÆ OLEUM FIXUM. *Ed.*

Palm Oil.

Huile de palme, *Fr.;* Palmöl, *Germ.;* Aceyte de palma, *Span.*

The *Cocos butyracea* belongs to the class and order *Monœcia Hexandria* and to the family of the Palms. It grows in Brazil, and other parts of South America, and bears a nut, from the kernel of which an oil is obtained by expression, used by the natives in its recent state for dressing food, and when old for burning in lamps. But the Edinburgh College probably errs in ascribing the palm oil of commerce to this tree. That employed in Europe and the United States is thought to be derived chiefly from the *Elais Guiniensis*, a native of the western coast of Africa, and cultivated in the West Indies and South America. This is also a palm, and is placed by systematic writers in the class and order *Diœcia Hexandria*, though stated b others to be really monœcious. It is among the handsomest trees of its graceful family which flourish in the tropical regions of Africa. The oil is obtained by expression from the fruit. It is brought to this country chiefly from Liberia, and other places on the African coast, though prepared also in the West Indies, Cayenne, and Brazil. The probability is that various species of palms contribute to the supply of this article of commerce.

Palm oil has the consistence of butter, a rich orange-yellow colour, a sweetish taste, and an agreeable odour, compared by some to that of violets, by others to that of the Florentine orris. By age and exposure it becomes rancid, and of a whitish colour. It melts with the heat of the hand, and when perfectly fluid passes readily through blotting paper. Highly rectified alcohol dissolves it at common temperatures, and in ether it is soluble in all proportions. According to M. Henry, it consists of 31 parts of stearin and 69 of of elaïn.

It is said to be frequently imitated by a mixture of lard and suet, coloured with tumeric, and scented with Florentine orris. The use to which it is chiefly applied, is the manufacture of a toilet soap, which retains the pleasant odour of the oil.

Medical Properties and Uses. Palm oil is emollient, and has sometimes been employed in friction or embrocation, though not superior for this purpose to many other oleaginous substances. W.

* * *

OLEUM LIMONIS. *U.S.*

Oil of Lemons.

"Citrus medica. Fructûs corticis oleum volatile. *The volatile oil of the rind of the fruit.*" *U. S.*

Off. Syn. LIMONUM OLEUM. Corticis exterioris oleum essentiale. *Lond.;* CITRI MEDICÆ OLEUM VOLATILE. Ex cortice fructûs. *Ed.;* CITRUS MEDICA. Fructûs tunicæ exterioris oleum volatile. *Dub.*

Huile de citron, *Fr.;* Cetronenöl, *Germ.;* Olio di limone, *Ital.;* Aceyte de limon, *Span.* See LIMON.

The exterior rind of the lemon abounds in an essential oil, which, as it is contained in distinct cellules, may be separated by simple expression. The rind is first grated from the fruit, and then submitted to pressure in a bag of fine cloth. The oil thus obtained is allowed to stand till it becomes clear, when it is decanted, and preserved in stopped bottles. By a similar process, that delightful perfume, the *essence of bergamot*, is procured from the fruit of the *Citrus bergamia vulgaris* of Risso, or common bergamot tree; and the oil called by the French *huile de cedrat*, from the citron, or fruit of the proper *Citrus medica*, of which the lemon-tree is a variety. All these oils may also be obtained by distillation; but thus procured, they have less of the peculiar flavour of the fruit, and the mode by expression is generally preferred. They are all brought originally from Italy, Portugal, or the South of France.

Properties. The oil of lemons is a very volatile fluid, having the odour of the fruit, and a warm, pungent, aromatic taste. As ordinarily procured it is yellow, and has the specific gravity 0.8517; but by distillation it is rendered colourless; and if three-fifths only are distilled, its sp. gr. is reduced to 0.847, at 71° F. When perfectly pure, it consists exclusively of carbon and hydrogen, and is said to be identical in composition with pure oil of turpentine. In this state it is capable of absorbing almost half its weight of muriatic acid gas, by which it is converted into a crystalline substance, and a yellow oily fuming liquid. The crystals are analogous to the artificial camphor which results from the action of muriatic acid upon the oil of turpentine.

The oil of lemons is often adulterated by the fixed oils and by alcohol, the former of which may be detected by the permanent stain which it imparts to paper, the latter by the milkiness produced by the addition of water.

Medical Properties and Uses. This oil has the stimulant properties of the aromatics; but is almost exclusively used to impart a pleasant flavour to other medicines.

Off. Prep. Alcohol Ammoniatum Aromaticum, *U. S.*, *Ed.*, *Dub.* W.

OLEUM LINI. *U.S.*, *Lond.*, *Dub.*

Flaxseed Oil.

"Linum usitatissimum. Seminum oleum. *The oil of the seeds.*" *U.S.*

Off. Syn. OLEUM LINI USITATISSIMI. *Ed.*

Linseed oil; Huile de lin, *Fr.;* Leinöl, *Germ.;* Olio di lino, *Ital.;* Aceyte de linaza *Span.*

See LINUM.

This oil is obtained by expression from the seeds of the *Linum usitatissimum*, or common flax. In the British Pharmacopœias, directions are given for preparing it by expressing the bruised seeds without heat; but as it is always in this country purchased by the druggists, it has been introduced in the United States Pharmacopœia, into the catalogue of the Materia Medica. In its preparation on a large scale, the seeds are usually roasted before being submitted to pressure, in order to destroy the gummy matter contained in their exterior coating. The oil is thus obtained more free from mucilage, but more acrid than that procured by cold expression. Flaxseed oil is of a yellowish-brown colour, a disagreeable odour, and nauseous taste; is of the sp. gr. 0.932; boils at 600° F.; does not congeal at zero; becomes rancid with facility, and has the property of drying or becoming solid on exposure to the air. On account of its drying property, it is highly useful in painting, and the formation of printers' ink.

Medical Properties and Uses. It is laxative in the dose of a fluidounce, but on account of its disagreeable taste is seldom given internally. It is sometimes added to purgative enemata; but its most ordinary application is externally to burns, usually in combination with lime-water.

Off. Prep. Linimentum Calcis, *U.S.*, *Ed.*, *Dub.* W.

OLEUM MYRISTICÆ. *U.S.*

Oil of Nutmeg.

"Myristica moschata. Nucleorum oleum expressum. *The expressed oil of the kernels.*" *U.S.*

See MYRISTICA.

This substance, usually but erroneously called *oil of mace*, is obtained from nutmegs by bruising them in a heated mortar, and afterwards compressing them strongly between heated plates. A liquid oil flows out, which becomes solid when it cools. It has been admitted into the London and Dublin Pharmacopœias, and that of the United States. Nutmegs are said to yield from ten to twelve per cent. of this oil.

The best is imported from the East Indies in stone jars. It is solid, soft, unctuous to the touch, of a yellowish or orange-yellow colour more or less mottled, with the odour and taste of nutmeg. It is composed, according to Schrader, of a soft oily substance, yellowish or brownish, soluble in cold alcohol and ether; a white, pulverulent, inodorous substance, insoluble in these liquids; and a volatile oil, to which it owes its aromatic odour. Eighteen parts are said to furnish one part of volatile oil.

An inferior kind is prepared in Holland, and sometimes found in the shops. It is in hard, shining, square cakes, of a lighter colour than that from the East Indies, with less smell and taste. It is supposed to be prepared from nutmegs, previously deprived of most of their essential oil by distillation.

An artificial preparation is sometimes substituted for the genuine oil. It is made by mixing together various fatty matters, such as suet, palm oil, spermaceti, wax, lard, &c., adding some colouring substance, and giving flavour to the mixture by the volatile oil of nutmeg.

The expressed oil of nutmeg is never used in medicine, except as a gentle external stimulant, and seldom even for this purpose.

Off. Prep. Emplastrum Picis Compositum, *Lond.* W.

OLEUM OLIVÆ. *U.S.*

Olive Oil.

"Olea Europœa. Fructûs oleum. *The oil of the fruit.*" *U.S.*

Off. Syn. OLIVÆ OLEUM. Olea Europœa. Druparum oleum expressum. *Lond.;* OLEÆ EUROPŒÆ OLEUM FIXUM. Ex fructu. *Ed.;* OLEA EUROPŒA. Oleum ex fructu. *Dub.*

Huile d'olive, *Fr.;* Olivenhöl, *Germ.;* Olio delle olive, *Ital.;* Aceyte de olivas, *Span.*

Olea. *Sex. Syst.* Diandria Monogynia.—*Nat. Ord.* Jasmineæ, *Juss.;* Oleaceæ, *Lindley.*

Gen. Ch. Corolla four-cleft, with subovate segments. *Drupe* one-seeded. *Willd.*

Olea Europœa. Willd. *Sp. Plant.* i. 44; Woodv. *Med. Bot.* p. 280. t. 98. This valuable tree is usually from fifteen to twenty feet in height, though it sometimes attains a much greater size, particularly in Greece and the Levant. It has a solid, erect, unequal stem, with numerous straight branches, covered with a grayish bark. The leaves, which stand opposite to each other on short footstalks, are evergreen, firm, lanceolate, entire, two or three inches in length, with the edges somewhat reverted, smooth and of a dull green colour on their upper surface, whitish and almost silvery beneath. The flowers are small, whitish, and disposed in opposite axillary clusters, which are about half as long as the leaves, and accompanied with small, obtuse, hoary bractes. The fruit or olive is a smooth, oval drupe, of a greenish, whitish, or violet colour, with a fleshy pericarp, and a very hard nut of a similar shape. The flowers are not at all fruitful, as clusters containing not less than thirty yield only two or three ripe olives.

The olive tree, though believed by some to have been originally from the

Levant, flourishes at present in all the countries bordering on the Mediterranean, and has been cultivated from time immemorial in Spain, the South of France, and Italy. It begins to bear fruit after the second year, is in full bearing at six years, and continues to flourish for a century. There are several varieties, distinguished by the form of the leaves, and the shape, colour, and size of the fruit. The variety *longifolia* of Willdenow is said to be the most esteemed.

The leaves and bark of the olive tree have an acrid and bitterish taste, and have been employed as substitutes for cinchona, though with no great success. In hot countries a substance resembling the gum-resins exudes spontaneously from the bark. It was thought by the ancients to possess useful medicinal properties; but is not now employed. Analyzed by Pelletier, it was found to contain resinous matter, a small quantity of benzoic acid, and a peculiar principle analogous to gum, which has received the name of *oliville.* But the fruit is by far the most useful product of the tree. In the state in which it is gathered, it is hard and insupportably acrid; but when macerated in water, or an alkaline solution, and afterwards introduced into a solution of common salt, it loses these properties, and becomes a pleasant and highly esteemed article of diet. The pericarp, or fleshy part of the olive, abounds in a fixed oil, which constitutes its greatest value, and for which the tree is chiefly cultivated in the South of Europe. The oil is obtained by first bruising the olives in a mill, and then submitting them to pressure. The product varies much, according to the state of the fruit and the circumstances of the process. The best oil, called *virgin oil*, is obtained from the fruit picked before it has arrived at perfect maturity, and immediately pressed. It is distinguished by its greenish hue. The common oil used for culinary purposes, and in the manufacture of the finest soaps, is procured from very ripe olives, or from the pulp of those which have yielded the virgin oil. In the latter case, the pulp is thrown into boiling water, and the oil removed as it rises to the surface. An inferior kind, employed in the arts, especially in the preparation of the coarser soaps, plasters, unguents, &c., is afforded by fruit which has been thrown into heaps and allowed to ferment for several days, or by the *marc* left after the expression of the finer kinds of oil, broken up, exposed to the fermenting process, and again introduced into the press.

Olive oil is imported in glass bottles, or in flasks surrounded by a peculiar kind of net-work made of grass, and usually called Florence flasks. The best comes from the South of France, where most care is exercised in the selection of the fruit.

Properties. The pure oil is an unctuous liquid, of a pale yellow or greenish-yellow colour, with scarcely any smell, and a bland slightly sweetish taste. Its sp. gr. is 0.9153. It begins to congeal at 38° F. At a freezing temperature its stearin becomes solid, and the elaïn, retaining its liquid consistence, may be separated by pressure. or by the agency of cold alcohol, which dissolves it, leaving the concrete principle.

Olive oil when exposed to the air is apt to become rancid, acquiring a disagreeable smell, a sharp taste, a thicker consistence, and a deeper colour; and the change is promoted by heat. It is said to be frequently adulterated with the cheaper fixed oils, especially with that of poppies; but the adulteration may usually be detected by reducing the temperature to the freezing point. As other oils are less readily congealed than the olive oil, the degree of its purity will be indicated by the degree of concretion. Another mode has been indicated by M. Poutet, founded on the property possessed by the supernitrate of mercury of solidifying the oil of olives, without a similar influence upon the other oils. Six parts of mercury are dissolved at a low temperature in seven parts and a half of nitric acid of the sp. gr. 1.35; and this solution is mixed with the suspected oil in the proportion of one part to twelve, the mixture being occasionally shaken. If the oil is pure, it is converted after some hours into a yellow solid mass; if it contain a minute proportion, even so small as a twentieth of poppy oil, the resulting mass is much less firm; and a tenth prevents a greater degree of consistence than oils usually acquire when they concrete by cold.

Medical Properties and Uses. Olive oil is nutritious and mildly laxative, and is occasionally given in cases of irritable intestines, when the patient objects to more disagreeable medicines. Taken into the stomach in large quantities, it serves to involve acrid and poisonous substances, and mitigate their action. It has also been recommended as a remedy for worms, and is a very common ingredient in laxative enemata. Externally applied, it is useful in relaxing the skin, and sheathing irritated surfaces from the action of the air; and is much employed as a vehicle or diluent of more active substances. In the countries bordering on the Mediterranean, it is thought, when smeared over the skin, to afford some protection against the plague; and applied warm, by means of friction over the surface, is said to be useful as a remedy in the early stages of that complaint. But the most extensive use of olive oil is in pharmacy, as a constituent of liniments, ointments, cerates, and plasters.

The dose as a laxative is from one to two fluidounces. W.

OLEUM RICINI. *U.S.*

Castor Oil.

"Ricinus communis. Seminum oleum. *The oil of the seeds.*" *U. S.*

Off. Syn. RICINI OLEUM ET SEMINA. Ricinus communis. Oleum e seminibus expressum. *Lond.;* RICINI COMMUNIS OLEUM FIXUM. Ex seminibus. *Ed.;* RICINUS COMMUNIS. Oleum e seminibus. *Dub.*

Huile de ricin, *Fr.;* Ricinusöl, *Germ.;* Olio di ricino, *Ital.;* Aceyte de ricino, *Span.*

Ricinus. *Sex. Syst.* Monœcia Monodelphia.—*Nat. Ord.* Euphorbiaceæ.

Gen. Ch. Male. *Calyx* five-parted. *Corolla* none. *Stamens* numerous. Female. *Calyx* three-parted. *Corolla* none. *Styles* three, bifid. *Capsule* three-celled. *Seed* one. *Willd.*

Ricinus communis. Willd. *Sp. Plant.* iv. 564; Woodv. *Med. Bot.* p. 624. t. 221. The castor oil plant, or *palma Christi*, as it was formerly called, attains in the East Indies and Africa the character of a tree; and rises sometimes thirty or forty feet in height. In the temperate latitudes of North America and Europe it is an annual plant; though we are informed by M. Achille Richard, that in the South of France, in the vicinity of Nice, on the seacoast, he saw a small wood consisting entirely of this species of Ricinus. The following description applies to the plant as cultivated in cool latitudes. Its general aspect is very peculiar, and not inelegant. The stem is of vigorous growth, erect, round, hollow, smooth, glaucous, somewhat purplish towards the top, branching, and from three to eight feet or more in height. The leaves are alternate; peltate or supported upon footstalks inserted into their lower disk; palmate, with seven or nine pointed serrate lobes; smooth on both sides; and of a bluish-green colour. The flowers are monœcious, stand upon jointed peduncles, and form a pyramidal terminal raceme, of which the lower portion is occupied by the male flowers, the upper by the female. Both are destitute of corolla. In the male flowers the calyx is divided into five oval, concave, pointed, reflected, purplish segments, and encloses numerous stamens, which are united into fasciculi at their base. In the female, the calyx has three or five narrow lanceolate segments; and the ovary, which is roundish and three-sided, supports three linear, reddish stigmas, forked at their apex. The fruit is a roundish glaucous capsule, with three projecting sides, covered with tough spines, and divided into three cells, each containing one seed, which is expelled by the bursting of the capsule.

This species of Ricinus is a native of the East Indies and Northern Africa; has become naturalized in the West Indies; and is cultivated in various parts of the world, in no country perhaps more largely than in the United States. New Jersey, Virginia, North Carolina, and the States upon the right bank of the Ohio, are the sections in which it is most abundant. The flowers appear in July, and the seeds ripen successively in August and September. The part employed in medicine is the fixed oil extracted from the seeds; and as this is always purchased by the apothecary, it has been very correctly placed, in the United States Pharmacopœia, among the original articles of the Materia Medica. The London College gives a process for its preparation, and therefore directs the seeds in its officinal catalogue.

1. The SEEDS. These are about as large as a small bean, oval, compressed, obtuse at the extremities, very smooth and shining, and of a grayish or ash colour, marbled with reddish-brown spots and veins. At one end of the seed is a small yellowish tubercle, from which an obscure longitudinal ridge proceeds to the opposite extremity, dividing the side upon which it is situated into two flattish surfaces. In its general appearance the seed is thought to resemble the insect called the *tick*, the Latin name of which has been adopted as the generic title of the plant. Its variegated colour depends upon a very thin pellicle, closely investing a hard, brittle, blackish, tasteless, easily separable shell, within which is the kernel, highly oleaginous, of a white colour, and a sweetish taste succeeded by a slight degree of acrimony. The seeds easily become rancid, and are then unfit for the extraction of the oil, which is acrid and irritating. In 100 parts of the seeds Geiger found, exclusive of moisture, 23.82 parts of envelope, and 69.09 of kernel. These 69.09 parts contained 46.19 of fixed oil, 2.40 of gum, 20.00 of starch and lignin, and 0.50 of albumen.

Taken internally the seeds are powerfully cathartic, and often emetic. Two or three are sufficient to purge, and seven or eight act with great violence. This property depends upon an acrid principle, which has by some been thought to exist exclusively in the integuments, by others in the embryo. But it is now satisfactorily ascertained that the integuments are inert; and Guibourt maintains that the principle alluded to pervades the whole kernel, in connexion with the oil. This principle is volatile, and dissipated by the heat of boiling water. By a much greater heat the oil itself becomes altered, and acquires acrid properties.

2. The OIL. This may be extracted from the seeds in three ways; 1. by decoction, 2. by expression, and 3. by the agency of alcohol.

The process by decoction, which is practised in the East and West Indies, consists in bruising the seeds previously deprived of their husk, and then boiling them in water. The oil, rising to the surface, is skimmed or strained off, and afterwards again boiled with a small quantity of water to dissipate the acrid principle. To increase the product it is said that the seeds are sometimes roasted. The oil is thus rendered brownish and acrid; and the same result takes place in the second boiling, if care is not taken to suspend the process soon after the water has been evaporated. Hence it happens that the West India oil has generally a brownish colour, an acrid taste, and irritating properties.

The mode by expression is directed by the London College, which simply orders the seeds, previously decorticated, to be bruised, and the oil expressed without heat. But these directions are both redundant and deficient. The removal of the outer covering of the seeds is unnecessary, as it contains no injurious principle; and something more than simple expression is requisite to obtain the oil in a state fit to be kept in the shops. The following, as we have been informed, are the outlines of the process usually employed by those who prepare the oil on a large scale in this country. The seeds having been thoroughly cleansed from the dust and fragments of the capsules with which they are mixed, are conveyed into a shallow iron reservoir, where they are submitted to a gentle heat insufficient to scorch or decompose them, and not greater than can be readily borne by the hand. The object of this step is to render the oil sufficiently liquid for easy expression. The seeds are then introduced into a powerful screw press. A whitish oily liquid is thus obtained, which is transferred to clean iron boilers, supplied with a considerable quantity of water. The mixture is boiled for some time, and, the impurities being skimmed off as they rise to the surface, a clear oil is at length left upon the top of the water, the mucilage and starch having been dissolved by this liquid, and the albumen coagulated by the heat. The latter ingredient forms a whitish layer between the oil and the water. The clear oil is now carefully removed; and the process is completed by boiling it with a minute proportion of water, and continuing the application of heat till aqueous vapour ceases to rise, and till a small portion of the liquid taken out in a vial, preserves a perfect transparency when it cools. The effect of this last operation is to clarify the oil, and to render it less irritating by driving off the acrid volatile matter. But much care is requisite not to push the heat too far, as the oil then acquires a brownish hue, and an acrid, peppery taste, similar to those of the West India medicine. After the completion of the process, the oil is put into barrels, and thus sent into the market. One bushel of good seeds yields five or six quarts, or about twenty-five per cent. of the best oil. If not very carefully prepared, it is apt to deposite a sediment upon standing; and the apothecary frequently finds it necessary to filter it through paper before dispensing it. Perhaps this may be owing to the plan adopted by some of purifying the oil after expression, by merely allowing it to stand for some time, and then drawing off the supernatant liquid. We have been told that the oil in barrels occasionally deposites a copious whitish sediment in cold weather, which it redissolves when the temperature rises. This substance is probably stearin, or an analogous principle. A large proportion of the drug consumed in the eastern section of the Union, is derived by way of New Orleans from Illinois and the neighbouring States, where it is so abundant that it is sometimes used for burning in lamps.

The process for obtaining castor oil by means of alcohol has been practised in France; but the product is said to become rancid more speedily than that procured in the ordinary mode.

Properties. Pure castor oil is a thick, viscid, colourless fluid, with little or no odour, and a mild though somewhat nauseous taste, followed by a slight sense of acrimony. As found in the shops it is often tinged with yellow, and has an unpleasant smell; and parcels are sometimes though rarely met with, of a brownish colour, and hot acrid taste. It does not readily congeal by cold. When exposed to the air it slowly thickens, without becoming opaque, and it ranks among the drying oils. It is heavier than most of the other fixed oils, from which it differs also in being soluble in all proportions in cold absolute alcohol. Weaker alcohol, of the sp. gr. 0.8425, takes up about three-fifths of its weight. Adulterations with other fixed oils may thus be detected, as the latter are but slightly soluble in this fluid. Such adulterations, however, are not practised in this country. Castor oil is also soluble in sulphuric ether. When distilled it yields, according to MM. Bussy and Lecanu, 1. a colourless, highly odorous volatile oil, which crystallizes by cold, 2. two oleaginous acids, denominated ricinic and oleo-ricinic, which are excessively acrid and nearly concrete, and 3. a solid spongy residue, amounting to two-thirds of the oil employed. Supposing these acids to be developed by heat, we can readily account for the injurious influence of too high a temperature in the preparation of the oil. Alkalies unite with castor oil forming soaps, and determine the formation of the margaric acid, besides the two above mentioned. Its purgative property is ascribed by MM. Bussy and Lecanu to the oil itself, and not to any distinct principle which it may hold in solution. It differs in this respect from the croton oil, though derived from a plant belonging to the same natural family.

Castor oil which is acrid to the taste may be rendered mild by boiling it with a small proportion of water. If turbid, it should be clarified by filtration through paper. On exposure to the air, it is apt to become rancid, and is then unfit for use.

Medical Properties and Uses. Good castor oil is a mild cathartic, speedy in its action, usually operating with little griping or uneasiness, and evacuating the contents of the bowels without much increasing the alvine secretions. Hence it is particularly applicable to cases of constipation from collections of indurated feces, and to those cases in which acrid substances have been swallowed, or acrid secretions have accumulated in the bowels. From its mildness it is also especially adapted to diseases attended with irritation or inflammation of the bowels, as colic, diarrhœa, dysentery, and enteritis. It is habitually resorted to in the cases of pregnant and puerperal women; and is decidedly, as a general rule, the best and safest cathartic for children. Infants usually require a larger relative dose than adults, probably because they digest a larger proportion of the oil.

The dose for an adult is about a fluidounce, for an infant from one to three or four fluidrachms. It is sometimes of exceedingly difficult administration, not so much from any peculiarly unpleasant taste, as from the recollection of former nausea, or other uneasiness which it may have produced, and from its clamminess and unpleasant adhesiveness to the mouth. In a few cases the disgust which it excites is utterly unconquerable by any effort of resolution. It is desirable, therefore, to obviate this inconvenience as far as possible by the mode of exhibition. A common method is to give it floating on the surface of mint or cinnamon water; but that which we have found upon the whole the least offensive, is to mix it with a cup of hot sweetened coffee, by which it is rendered more fluid, and its taste considerably disguised. Some take it in wine or spirituous liquors; but these are generally contraindicated in the cases to which the medicine is applicable. When the stomach is unusually delicate, the oil may be made into an emulsion with mucilage or the yolk of an egg, loaf sugar, and some aromatic water. To this mixture laudanum may be added in cases of intestinal irritation. Castor oil may also be beneficially used as an enema in the quantity of two or three fluidounces mixed with some mucilaginous liquid.

Though apt to become rancid by itself, it loses much of this susceptibility when mixed with lard; and some apothecaries are said to use it as a substitute for olive oil in unguents and cerates. But the slightly irritating properties of even the mildest castor oil, render it inapplicable in those preparations which are intended rather to alleviate irritation than to produce it.
W.

OLEUM SESAMI. *U.S. Secondary.*

Benne Oil.

"Sesamum orientale. Seminum oleum. *The oil of the seeds.*" *U.S.* See SESAMUM.

OLEUM TEREBINTHINÆ. *U.S., Dub.*

Oil of Turpentine.

"Pinus palustris et aliæ. Succi oleum volatile. *The volatile oil of the juice.*" *U.S.*

Off. Syn. TEREBINTHINÆ OLEUM. *Lond.;* PINI OLEUM VOLATILE. *Ed.;* PINUS SYLVESTRIS. Oleum volatile. *Dub.*

Huile volatile de térébenthine, *Fr.;* Terbinthinöl, *Germ.;* Olio della trementina, *Ital.;* Aceyte de trementina, *Span.*

See TEREBINTHINA.

The oil of turpentine is prepared by distillation from our common turpentine, though equally afforded by other varieties. The Dublin College gives the following formula for its preparation. "Take of common turpentine, [*Terebinthina Vulgaris*, Lond.] five pounds; water, four pints. Draw off the oil in a copper alembic." But it is at present never prepared by the apothecary, and in all the other Pharmacopœias is placed in the catalogue of the Materia Medica. The turpentine of the *Pinus palustris* is said to yield about seventeen per cent. of oil; while the common turpentine of Europe affords twenty-four per cent. Large quantities of the oil are distilled in North Carolina for exportation.

Pure oil of turpentine is perfectly limpid and colourless, of a strong, penetrating, peculiar odour, and a hot, pungent, bitterish taste. It is much lighter than water, having the specific gravity 0.86 at 72° F.; is highly volatile and inflammable; boils at a temperature somewhat higher than 300°; is very slightly soluble in water, less soluble in alcohol than most other volatile oils, and readily soluble in sulphuric ether. Boiling alcohol dissolves it with facility, but deposites most of the oil upon cooling. One hundred parts of alcohol of 0.84, dissolve 13.5 parts of the oil at 72°. As found in commerce, it always contains oxygen; but when perfectly pure, it consists exclusively of carbon and hydrogen, and, according to Dumas, is isomeric with the base of camphor. MM. Blanchet and Sell think they have shown that it consists of two distinct isomeric oils, which, by the absorption of oxygen are converted into two distinct resins, corresponding to those found by Unverdorben in colophony, and differing from each other in their solubilities in alcohol. (*Journ. de Pharm.* xx. 226.) On exposure to the air and light, oil of turpentine deposites a white solid matter in acicular crystals, which are without taste or smell, insoluble in cold water, but soluble in ether and alcohol. (*Boissenot, Journ. de Chim. Med.* ii. 143.) White crystals of stearoptene, heavier than water and fusible at 20°, separate from the oil at the temperature of 18° below zero. The oil of turpentine absorbs muriatic acid gas, which forms with it a white crystalline substance which bears a strong resemblance to camphor, and on this account is usually called *artificial camphor.*

Exposed to the air the oil absorbs oxygen, becomes thicker and yellowish, and loses much of its activity. Hence the British Colleges direct a process for its rectification, consisting in distilling it with about four measures of water. But the process is difficult, in consequence of the great inflammability of the vapour, and its rapid formation, which causes the liquid to boil over. In this country it is scarcely necessary, as the recent oil can be obtained at an expense less than that which would be incurred by its redistillation on a small scale. Another mode of purifying the oil is to agitate it with one-eighth of alcohol, which dissolves the portion that has become resinous by the absorption of oxygen. About one-fifth of the alcohol is retained by the oil, but is readily separated by agitation with water.

Medical Properties and Uses. The oil of turpentine is stimulant, diuretic, anthelmintic, in large doses cathartic, and externally rubefacient. When swallowed in moderate quantities it produces a sense of warmth in the stomach, accelerates the circulation, and increases the heat of the skin, without especially affecting the functions of the brain. In small doses frequently repeated it stimulates the kidneys, augmenting the secretion of urine, and often producing, especially if long continued, painful irritation of the urinary passages, amounting sometimes to violent strangury. At the same time it imparts the odour of violets to the urine; and this effect is also produced by its external application, or even by breathing the air of an apartment impregnated with its vapours. In large doses it occasions slight vertigo, or a sense of fulness in the head, sometimes amounting to intoxication, attended frequently with nausea, and succeeded generally, though not always, by speedy and brisk catharsis. When this effect is experienced, the oil is carried out of the bowels, and, no time being allowed for absorption, is less apt to irritate the kidneys and bladder than when taken in small and repeated doses. In some constitutions it produces, even when taken internally, an erythematic eruption on the skin.

The oil of turpentine is employed in numerous diseases. As a stimulant it is useful in low forms of fever, particularly in cases where there is reason to suspect ulcerations of the mucous membranes. There is a particular state of fever usually attended with much danger, in which we have found this remedy uniformly successful. The condition of things alluded to, is one which occurs in the latter stages of typhoid fevers or lingering remittents, in which the tongue having begun to throw off its load of fur in patches, has suddenly ceased to clean itself, and become dry and brownish. The skin is at the same time dry, the bowels torpid and distended with flatus, and the patient sometimes affected with slight delirium. Under the use of small doses of oil of turpentine frequently repeated, the tongue becomes moist, and again coated, the tympanitic state of the bowels disappears, and the patient goes on to recover as in a favourable case of fever. We are disposed to ascribe the effect to a healthy change produced by the oil in the ulcerated surface of the intestines. The medicine has also been recommended as a counter-irritant in yellow and puerperal fevers; and may undoubtedly be given with advantage in the latter stages of these diseases, and in other instances of gastric and enteritic inflammations, which require a resort to stimulation; but the highly favourable reports which have been made of its effects in the early stages of puerperal peritonitis, have probably originated in the confounding of intestinal irritation with that formidable disease. In chronic rheumatism, particularly sciatica and lumbago, the oil has often been given with great benefit. It has also been much extolled as a remedy in neuralgia, in epilepsy and tetanus, in passive hemorrhages, particularly from the bowels, in disordered conditions of the alimentary canal attended with sallow countenance, foul tongue, tumid abdomen, sour or fetid eructation, and general depravation of health, in obstructions of the bowels, in some forms of chronic dysentery and diarrhœa, in obstinate gleets and leucorrhœa, and in chronic nephritic and calculous affections. As a vermifuge also it is very highly esteemed, especially in cases of tænia. It appears, by its poisonous operation, to destroy or debilitate the worm, which losing its hold upon the bowels is then easily discharged. In cases of worms in the stomach it is often very beneficial. The worms, in this instance, are destroyed and digested as any other dead animal matter. In dropsies with feeble action, the oil may sometimes be advantageously given as a diuretic; and in amenorrhœa from torpor of the uterine vessels it is occasionally useful. As a local stimulant or carminative it may be given beneficially in some instances of flatulent colic, and gout in the stomach.

The dose for ordinary purposes is from five to thirty drops, repeated every hour or two in acute, and three or four times a day in chronic diseases. In rheumatism it is recommended by some in the dose of a fluidrachm every four hours. As a remedy for the tape-worm it is given in the quantity of one or two fluidounces, and should be followed by castor oil if it do not operate in three or four hours. In ordinary cases of worms, the dose is much smaller. It may be administered dropped on sugar, or in emulsion with gum Arabic, loaf sugar, and cinnamon or mint water.

In the form of enema it is highly useful in cases of ascarides, obstinate constipation, and distension of the bowels from accumulation of air. No remedy is more effectual in tympanites than injections of the oil of turpentine. From half a fluidounce to two fluidounces may be administered in this way, suspended by the yolk of eggs in a half pint or a pint of water or some mucilaginous fluid.

Externally applied, the oil of turpentine irritates and speedily inflames the skin; and in low forms of fever, with coldness of the surface, is when heated one of the most efficacious rubefacients. It is also used as a liniment in rheumatic and paralytic affections, and various internal inflammations. It should generally, in mild cases, be diluted with olive oil; and in some constitutions, even in this state, produces such violent inflammation of the skin, with extensive eruptions, as to render its external use in any shape improper. Mixed with some mild oil and introduced on cotton into the ear, it is sometimes beneficial in deafness arising from a deficient or unhealthy secretion of wax. Applied to recent burns it is thought by some to be highly useful in allaying the burning pain and promoting a disposition to heal. For this purpose, however, it is usually mixed with the resin cerate, (*basilicon ointment*,) so as to form a liniment capable of being spread upon linen rags. (See *Linimentum Terebinthinæ.*)*

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* The following is the formula adopted by the Philadelphia College of Pharmacy for the preparation of the rubefacient liniment, so much sold under the name of *British oil.* ℞. Olei Terebinth. f℥viij, Olei Lini f℥viij, Olei Succini f℥iv, Olei Juniperi f℥iv, Petroeli Barbadens. f℥iij, Petrolei American. (Seneca oil) f℥j. Misce. *Journ. of the Phil. Col. of Pharm.* v. 29.

Off. Prep. Linimentum Cantharidis, *U.S.;* Linimentum Terebinthinæ, *U.S., Lond., Dub.;* Ol. Terebinth. Rectificatum, *Lond., Dub., Ed.* W.

OLEUM TIGLII. *U.S.*

Croton Oil.

"Croton tiglium. Seminum oleum. *The oil of the seeds.*" *U.S.*

Off. Syn. TIGLII OLEUM. Croton Tiglium. Oleum è seminibus expressum. *Lond.;* CROTON TIGLIUM. Oleum ex seminibus expressum. *Dub.*

Huile de croton, *Fr.;* Crotonöl, *Germ.;* Nervalum unnay, *Tamool.*

Croton. See CASCARILLA.

Croton Tiglium. Willd. *Sp. Plant.* iv. 543; *Flor. Zeyl.*, 343, Rheede, *Malab.*, ii. p. 61. This species of Croton is a small tree or shrub, with a few spreading branches, bearing alternate petiolate leaves, which are ovate, acuminate, serrate, smooth, of a dark green colour on the upper surface, paler beneath, and furnished with two glands at the base. The flowers are in erect terminal racemes, scarcely as long as the leaf—the lower being female, the upper male, with straw-coloured petals. The fruit is a smooth capsule, about the size of a filbert, with three cells, each containing a single seed.

The tree is a native of Hindostan, Ceylon, the Moluccas, and other parts of continental and insular India. It is pervaded throughout by an acrid purgative principle, which is probably analogous to that found in other plants belonging to the family of the Euphorbiaceæ. Rumphius says that the root is employed in Amboyna in the dose of a few grains as a drastic purge in dropsy; and, according to the same author, the leaves are so acrid that, when chewed and swallowed, they excite painful inflammation in the lips, mouth, throat, and along the whole course of the alimentary canal. The wood is said in small doses to be diaphoretic, in larger, purgative and emetic. But the seeds are the portion in which the active principle of the plant is most concentrated. These have been long employed throughout the whole of India as a powerful purgative, and were introduced so early as the year 1630 into Europe, where they were known by the names of *Grana Molucca* and *Grana Tiglia.* But in consequence of their violent effects they passed into neglect, and had ceased to be ranked among medicinal substances, when at a recent period attention was again called to them by the writings of some English physicians in India. They are now imported for the oil which they afford, and which is the only portion of the plant considered officinal.

These seeds are rather larger than a grain of coffee, of an oblong form, rounded at the extremities, with two faces, the external considerably more convex than the internal, separated from each other by longitudinal ridges, and each divided by a similar longitudinal ridge, so that the whole seed presents an irregular quadrangular figure. Sometimes, as in the grain of coffee, their internal surface is flat with a longitudinal groove, owing to the presence of only two seeds in the capsule, the groove being produced by the central column or axis. The shell is covered with a soft yellowish-brown epidermis, beneath which the surface is black and smooth; and as the epidermis is often partially removed by friction during their carriage, the seeds as they come to us are frequently of a mottled appearance, and sometimes nearly black. The kernel or nucleus is of a yellowish-brown colour, and abounds in oil. In India the seeds are prepared for use by submitting them to slight torrefaction, by which the shell is rendered more easily separable, and the acrid property thought to be mitigated. In the dose of one or two grains the kernel purges with great activity.

The oil is obtained by expression from the seeds, in general previously roasted, and deprived of the shell. It may also be separated by decoction in water, or by the action of ether, which dissolves the oil, and leaves it behind when evaporated. According to Dr. Nimmo, the seeds consist of 64 parts of kernel, and 36 of envelope, in the hundred; and the cotyledons yield 60 per cent. of oil.

Properties. Croton oil, as usually found in the shops, is of an orange or reddish-yellow colour, which is owing to the roasting of the seeds previously to expression, and varies more or less according to the greater or less duration of this process. When procured without roasting, it is very nearly colourless. Its smell is faint but peculiar, its taste hot and acrid, leaving in the mouth a disagreeable sensation which continues for many hours. The oil is wholly soluble in sulphuric ether and oil of turpentine, and partially so in alcohol. Dr. Nimmo ascertained that it consists of two portions, one acrid and purgative, amounting to forty-five per cent., soluble in cold alcohol, and having an acid reaction, the other a mild oleaginous substance like olive oil, soluble in ether and the oil of turpentine, and very slightly soluble in hot alcohol, from which it is precipitated when the liquor cools. The acrid portion consists of a resinous substance, and a very acrid volatile acid, for which Brandes has proposed the name of *crotonic acid.*

It is thought that the croton oil is often adulterated with other fixed oils; but, with the exception of castor oil, they may be detected by their less degree of solubility in alcohol, while the latter is discoverable by its greater solubility. If cold alcohol dissolve less than forty-five per cent. of a suspected sample, the presence of olive oil may be suspected, if more, that of castor oil. It would be difficult, as Dr. Duncan observes, to detect by this test a mixture of these two oils in certain proportions.

We have been told by Dr. Burrough, who was for some time in India, that much of the croton oil there prepared for exportation, is derived from the seeds of a plant wholly different from the Croton Tiglium. Dr. R. E. Griffith of Philadelphia informed us, that from a parcel of these seeds presented to him by Dr. Burrough, he had succeeded in raising a plant which proved to be the Jatropha Curcas, the seeds of which are known by the name of *Barbadoes nuts.* (See *Tapioca.*) The oil is weaker than the genuine croton oil, but is said by Dr. Burrough to be an efficient cathartic in the dose of three or four drops.

Medical Properties and Uses. The substance under consideration is a powerful hydragogue purgative, acting, for the most part, when administered in moderate doses, with ease to the patient; but in large doses apt to excite vomiting and severe griping pain, and capable, if immoderately taken, of producing fatal effects. It acts with very great rapidity, frequently evacuating the bowels in less than an hour, and generally exciting a rumbling sensation in half that period. It possesses also a great advantage in the minuteness of the dose, on account of which it may frequently be given when we should fail with more bulky medicines, as in mania, coma, and the cases of children. A drop placed on the tongue of a person in a comatose state will generally operate. Though long used in India, and known a century ago to the Dutch physicians, it did not attract general notice till about 1820, when it was introduced into England by Mr. Conwell. It is chiefly employed in cases of obstinate constipation, in which it often produces the happiest effects after the failure of other medicines; but it may also be advantageously employed in almost all cases in which powerful and speedy purging is demanded. Dropsy, apoplexy, mania, and visceral obstructions, are among the complaints in which it has been particularly recommended. The seeds are said to have been used with great success in India in amenorrhœa. Applied externally, the oil produces inflammation of the skin attended with a pustular eruption, and has been used in this way in rheumatism, gout, neuralgia, glandular and other indolent swellings, and in pulmonary diseases. It should be diluted with three parts of olive oil, soap-liniment, oil of turpentine, or other convenient vehicle, and applied in the way of liniment twice or oftener in the twenty-four hours. Sometimes the insusceptibility of the skin to its influence is such as to require its application undiluted. For further information on this subject the reader is referred to the *Amer. Journ. of Med. Sciences*, xv. 240.

The dose for an adult is one or two drops, and is most conveniently administered in the form of pill. A very safe and convenient plan is to make two drops into four pills with crumb of bread, and give one every hour till it operates. The oil may also be given in emulsion. The form of tincture may be advantageously resorted to when a minute quantity of the medicine is required, as it affords the means of readily dividing the dose. It is said that four drops of the oil applied externally by friction around the umbilicus, will produce a purgative effect. (*Dict. des Drogues.*) W.

OLIBANUM. *Lond.*

Olibanum.

"Juniperus Lycia. *Gummi-resina.*" *Lond.*

Off. Syn JUNIPERI LYCIÆ GUMMI-RESINA. *Ed.;* OLIBANUM. BOSWELLIA SERRATA. Gummi-resina. *Dub.*

Encens, *Fr.;* Weihrauch, *Germ.;* Olibano, *Ital.;* Olibano, Incienso, *Span.;* Koondir Zuckir, *Hindoo.;* Cundur Looban, *Arab.*

Olibanum, the *frankincense* of the ancients, was ascribed by Linnæus to the *Juniperus Lycia*, which is still recognised as its source by the London and Edinburgh Colleges, though the conjecture of Linnæus is now universally admitted to have been incorrect. There appear to be two varieties of olibanum, one derived from the countries bordering on the Red Sea, and taken to Europe by way of the Mediterranean, the other brought directly from Calcutta. The origin of the former remains yet undecided; though some writers refer it to a species of Amyris. The latter has been satisfactorily ascertained to be the product of the *Boswellia serrata* of Roxburgh, a large tree growing in the mountains of India, and found by Mr. Colebrook abundant in the vicinity of Nagpur. The tree belongs to the class and order *Decandria Monogynia*, and to the natural order *Terebintaceæ* of Kunth.

The Arabian or African frankincense is in the form of yellowish tears and irregular reddish lumps or fragments. The tears are generally small, oblong or roundish, not very brittle, with a dull and waxy fracture, softening in the mouth, and bearing much resemblance to mastich, from which, however, they differ in their want of transparency. The reddish masses soften in the hand, have a stronger smell and taste than the tears, and are often mixed with fragments of bark, and small crystals of carbonate of lime.

The Indian frankincense, or olibanum, consists chiefly of yellowish, somewhat translucent, roundish tears, larger than those of the African, and generally covered with a whitish powder produced by friction. It has a balsamic resinous smell, and an acrid, bitterish, and somewhat aromatic taste. When chewed it softens in the mouth, adheres to the teeth, and partially dissolves in the saliva, which it renders milky. It burns with a brilliant flame, and a fragrant odour. Triturated with water it forms a milky imperfect solution. Alcohol dissolves nearly three-fourths of it, and the tincture is transparent. From 100 parts, Braconnot obtained 8 parts of volatile oil, 56 of resin, 30 of gum, and 5.2 of a glutinous matter insoluble in water or alcohol, with 0.8 loss. Various saline substances were found in its ashes. The oil may be separated by distillation, and resembles that of lemons in colour and smell.

Medical Properties and Uses. Olibanum is stimulant like the other gum-resins; but is now never used internally. It is chiefly employed for fumigations, and enters into the composition of some unofficinal plasters.

W.

OPIUM. *U.S.*

Opium.

"Papaver somniferum. Succus concretus. *The concrete juice.*" *U.S.*

Off. Syn. OPIUM. Papaver somniferum. Capsularum immaturarum succus concretus. (Turcicus.) *Lond.;* OPIUM. Succus concretus Papaveris somniferi, *Ed.;* OPIUM. PAPAVER SOMNIFERUM. Capsularum succus proprius concretus. *Dub.*

Opium, *Fr.;* Opium, Mohnsaft, *Germ.;* Oppio, *Ital.;* Opio, *Span.;* Affioni, *Turk.;* Ufyoon, *Arab.;* Sheerikhaskash, *Persian.;* Ufeem, *Hindoo.*

Papaver. *Sex. Syst.* Polyandria Monogynia.—*Nat. Ord.* Papaveraceæ.

Gen. Ch. *Corolla* four-petaled. *Calyx* two-leaved. *Capsule* one-celled, opening by pores under the persistent stigma. *Willd.*

Opium is at present generally believed to be derived exclusively from the *Papaver somniferum*, though every species of poppy is capable of yielding it to a greater or less extent, and some authors have indicated the *Papaver orientale* as its real source. The British and French Pharmacopœias unite with our own in recognising only the first mentioned species.

Papaver somniferum. Willd. *Sp. Plant.* ii. 1147; Woodv. *Med. Bot.* p. 376. t. 138. There are two varieties of this species, which are distinguished by the titles of the white and black poppy, derived from the colour of their seeds. It is the former which is usually described as the proper opium plant.

The *white poppy* is an annual plant, with a round, smooth, erect, glaucous, often branching stem, rising two or three feet in height, and sometimes attaining five or even six feet in favourable situations. The leaves are large, variously lobed and toothed, and alternately disposed upon the stem which they closely embrace. The flowers are terminal, very large, and of a white or silver gray colour, with a tinge of violet at their base. In India they appear in February, in Europe and the United States, not earlier than June, July, or August. The calyx is smooth, and composed of two leaves, which fall when the petals expand. These are usually four in number; but there is a variety in which the flower is double. The germen, which is smooth and globular, supports a radiated stigma, and is surrounded by numerous short and slender filaments, with erect, oblong, compressed anthers. The capsule is smooth and glaucous, of a rounded shape, from two to four inches in diameter, somewhat flattened at the top and bottom, and crowned with the persistent stigma, the diverging segments of which are arranged in a circle upon the summit. It contains numerous minute white seeds, which, when perfectly ripe, escape through small openings beneath the stigma. The *black poppy* differs from the preceding variety only in the character of the fruit. The capsule is somewhat smaller and more globular, and the seeds are of a brown or blackish colour.

All parts of the poppy are said to contain a white opaque narcotic juice; but the leaves, when analyzed by M. Blondeau, yielded none of those active principles by which opium is characterized. (*Journ. de Pharm.* vii. 214.) It is in the capsule that the juice most abounds, and the virtues of the plant chiefly reside. Hence this part is sometimes employed medicinally in Europe, where it is considered officinal. (See *Papaveris Capsulæ.*) The seeds are wholly destitute of narcotic properties, and are even used as food in many parts of the world. The Romans employed them in the preparation of various dainties. They abound with a bland oil, which may be extracted by expression, and has most of the useful properties of olive oil. It is an article of much importance on the continent of Europe, particularly in France, in the northern departments of which the black poppy is very extensively cultivated for the seed alone. The oil is employed for culinary and pharmaceutic purposes, in painting, and the manufacture of soap, and in other ways as a substitute for olive oil, which is said to be frequently adulterated with it. The poppy does not appear to elaborate the milky fluid in which its narcotic properties reside, before a certain period of its growth; for we are told that in Persia, the young plants which are pulled up to prevent too thick a crop, are used as pot-herbs; and the μήκων of the Greeks, which is believed to be identical with the Papaver somniferum, is said by Hippocrates to be nutritive.

Though generally believed to be a native of Asia, this species of poppy grows wild in the South of Europe, and even in England, whither its seeds are supposed to have been brought at a very early period. It was cultivated by the ancient Greeks, and is mentioned by Homer as a garden plant. It is at present cultivated very extensively in India, Persia, Egypt, and Asiatic Turkey, for the opium which it affords; and in several parts of Europe, especially in France, not only for this product, but also for the seed and capsules. In this country it is found only in our gardens as an ornamental flower.

The process for procuring opium from the poppy, as practised by the modern inhabitants of India and Persia, according to the accounts of Kerr and of Kœmpfer, is very nearly the same with that described by Dioscorides as employed in his own times, about eighteen hundred years since. As the capsules abound most in the narcotic juice, it is from these that the opium is procured. The operation commences when they are about half grown. When ripe, they afford little or no juice. In the evening, near sunset, two or more longitudinal incisions are made in the capsule, so as not to penetrate its cavity; and are repeated several successive evenings, at the same time, till the whole circumference is scarified. The evening is preferred for the operation, as the night dews are supposed to favour the flow of the juice. The portion which exudes during the night, is scraped off in the morning, and put into suitable vessels, where, by exposure to the sun, and by kneading with the hand, it acquires a sufficient consistence to retain the shape into which it may be moulded. It is then formed into cakes, which are still further dried, then wrapped in leaves, and sent into the market. That opium is obtained by incisions in the capsule, and the collection of the juice which exudes, is evinced not only by the reports of travellers and eye-witnesses, such as Chardin, Kœmpfer, Olivier, and Kerr, but also by the success which has attended the employment of this method in Great Britain and France. Considerable quantities of good opium have been obtained by different individuals in England by scarifying the capsules of the poppy.* Similar success has been met with in France; and the drug obtained by incisions in both countries has been found nearly, if not quite equal to that imported from the East. In the *Dictionnaire des Drogues* it is even stated, that a specimen of opium collected in this way in the vicinity of Provins, gave sixteen per cent. of the active principle, while a good commercial specimen examined by M. Petit, afforded only eight per cent. But results equally favourable have not been generally obtained; and neither in England nor France is it probable that agriculturists will be able to stand a competition, in the culture of this drug, with the low price of labour, united with the favourable influence of climate, in the opium countries of Asia.

Another method of extracting the virtues of the capsules, is to select such as have ceased to yield their juice by exudation, to beat them with a small proportion of water, and inspissate the liquid thus obtained by artificial heat. The ancient Greeks were acquainted with both processes, as appears from the writings of Dioscorides. The term οπιον, derived from οπος, juice, they applied to the substance procured by incision, and answering precisely to the modern opium. The inspissated expressed juice they called μηκωνιον, from μηκων, the name of the plant. Tournefort states that it is the latter preparation which is exported from Turkey as opium, the former being much more valuable, and therefore retained in the country for the use of the great and wealthy. This error has been copied by many writers on the Materia Medica; and till within a comparatively few years, opium was generally believed to be an extract obtained by evaporating either the expressed juice, or a decoction of the capsules. The mistake has been corrected by the experiments of cultivators in England and France, by whom, as before stated, a substance having all the characters of commercial opium, was procured by incisions, while the inspissated expressed juice of the capsules, prepared by M. Deslongchamps, was found not to have more than half the strength.

Commercial History. Commerce is supplied with opium chiefly from Hindostan, Persia, and the Asiatic dominions of Turkey. Large quantities are produced in the Indian provinces of Bahar and Benares, to which the British East India Company, who exercise a monopoly of this branch of agriculture within their dominions, have restricted the cultivation of the poppy. In the interior provinces, which, though under the political control, are not under the immediate civil government of the Company, the natives raise an almost incredible amount of the drug; but little of this enters into maritime commerce, the greater part being consumed in the neighbourhood, or carried still further into the interior. Sir John Malcolm informs us, in his work on Central India, that 350,000 pounds are annually raised in Malwa. The opium produced under the monopoly of the Company, is distributed extensively through continental and insular India, where the Mahometan population employ it habitually in the place of spirituous liquors. Great quantities are also sent to China, into which it finds an easy entrance notwithstanding prohibitory laws. Much was formerly imported by the Company into England, through which a small portion reached our own country; but at present India opium is considered so far inferior to that from Turkey, that it has been almost entirely excluded from our market, and none is brought directly from the East. The great demand for it in the Indian Archipelago and in China, and its consequent high price, have probably contributed more even than its reputed inferiority to this result. Indeed, Ainslie explicitly states that India opium is inferior to none; and it is probable that the specimens from which the description was drawn up that is now current among authors upon the materia medica, were the refuse of the Eastern market. We know that the drug was formerly very much and variously adulterated by the natives. Among the impurities mentioned by authors are the extract of the poppy procured by decoction, the powdered leaves and stems of the plant made into a paste with mucilage, the oil of sesamum, catechu, and even cow-dung. But a more careful superintendence by the officers of the Company is said to have resulted in a great improvement of the India opium; and it is possible that if now imported it might not be found to answer the description usually met with in books.

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* So early as the year 1796, a premium was awarded by the society for the encouragement of arts, to Mr. Ball, for a specimen of British opium; and in 1823, Messrs. Cowley and Stains collected 196 pounds, which sold for nearly seven dollars a pound, from little more than twelve acres of land. This product, however, was by no means equal to that obtained in Scotland by Mr. John Young. From one acre of ground planted with poppies and potatoes, he procured fifty-six pounds of opium, valued at 450 dollars, while the whole expense was more than repaid by the potatoes, and the oil expressed from the seeds. For papers on the subject of the cultivation of the poppy in England, see *Edin. Philosoph. Journ.* vol. i. p. 258, and the *Quarterly Journal of Science*, vol. iv. p. 69.

Turkey opium is raised chiefly in Anatolia, and is shipped from the port of Smyrna. Much was formerly produced in Upper Egypt, especially in the district of ancient Thebes, which was supposed to yield it in greatest perfection. It was in fact for a long time generally known by the name of *Opium Thebaicum;* and laudanum is still frequently directed in prescriptions as the Tinctura Thebaica. Its cultivation has recently been again introduced into Egypt. The drug is imported into the United States, either directly from the Levant, or indirectly through the Mediterranean ports of France. From the treasury returns for the year 1829, it appears, that the value of opium brought from the Turkish dominions was 92,924 dollars, from France on the Mediterranean, 12,187 dollars, and from all other parts of the world only 2,040 dollars. None was imported from India. Turkey opium comes to us in masses of irregular size and shape, generally more or less flattened, covered with leaves, and with the reddish capsules of some species of *Rumex*, which are said to be absent in the inferior kinds, and may therefore be considered as affording some indication of the purity of the drug. We may account for this circumstance upon the very probable supposition, that the capsules are removed during the operation which the masses sometimes undergo in the hands of the merchants, after leaving those of the cultivators. We are told by the French writers, that extensive frauds are practised at Marseilles in this branch of commerce. The opium brought thither from the Levant is first softened, and then adulterated with various matters, which are incorporated in its substance. To use a strong expression of M. Guibourt, they make the opium over again at Marseilles. Our traders to the Mediterranean would do well to bear this assertion in mind. According to Dr. A. T. Thomson, one-fourth part of Turkey opium generally consists of impurities. Sand, ashes, the seeds of different plants, the extracts of the poppy, *Lactuca virosa*, *Glycyrrhiza glabra*, and *Chelidonium glaucum*, gum Arabic, tragacanth, aloes, even small stones, and minute pieces of lead and iron, are mentioned among the substances employed in the sophistication of the drug.*

* Three varieties of Turkey opium are to be met with in commerce, namely, the *Smyrna*, the *Constantinople*, and the *Egyptian*. The following description of these varieties is given by Guibourt in the *Journal de Pharmacie for December* 1831.

Opium is regarded as inferior when it is of a blackish colour; a weak or empyreumatic smell; a sweet or slightly nauseous and bitter taste; a soft, viscid, or greasy consistence; a dull fracture; or an irregular, heterogeneous texture, arising from the intermixture of foreign substances. It should not impart a deep brown colour to the saliva, nor leave a dark uniform trace when drawn over paper, nor form with water a thick viscid solution.

Properties. Good opium has a peculiar, strong, narcotic odour, and a bitter somewhat acrid taste. When long chewed it excites much irritation in the lips and tongue, and even blisters the mouth of those unaccustomed to its use. Its colour is a reddish-brown or deep fawn; its texture compact and uniform; its specific gravity 1.336. When drawn over paper it leaves an interrupted trace of a light brown colour. It is often soft in the interior of the mass, and in this state is tenacious; but when exposed to the air it gradually hardens, and ultimately becomes brittle, breaking with a uniform

"1. *Smyrna opium.* In larger or smaller masses, often deformed and flattened on account of their original softness; covered externally with seeds analogous to those of Rumex; becoming black and dry in the air; of a strong virose odour. This opium is justly most esteemed; but it is proper to observe that it is liable to be mixed with a kind of opium in *balls* or *round masses*, which are hard and of inferior quality."

"2. *Constantinople opium.* In small, flattened, tolerably regular lumps, of a lenticular form, from two inches to two inches and a half in diameter, always covered with a poppy leaf, the middle nerve of which usually marks the middle of the mass. Odour similar to that of the preceding, but weaker. It blackens and dries in the air. Some persons say that this is nothing more than the Smyrna opium, which has been re-manufactured at Constantinople, and often mixed with gum, which injures its quality."

"3. *Egyptian opium.* In round flattened lumps, larger than the preceding, tolerably regular in their form, very clean upon their surface, and appearing to have been covered with a leaf, of which only vestiges remain. This opium is distinguishable from the preceding by its reddish colour, analogous to that of hepatic aloes, by a weaker odour, and by softening instead of drying in the open air. It has, moreover, a shining surface, somewhat adhesive to the fingers."

Four ounces of each of these varieties, well selected, yielded to Guibourt, under the same treatment, the following quantities of morphia not entirely pure:—viz. Smyrna opium 7 dr. 18 gr., Egyptian opium 5 dr. 20 gr., Constantinople opium 3 dr. 55 gr. From this experiment it would appear that the Smyrna is the most powerful, and the Constantinople the most feeble, the Egyptian being intermediate. The last variety has recently been introduced into this country in considerable quantities. As brought to our market, there is reason to believe that it is an article much inferior to Smyrna opium; as a specimen analyzed by Mr. J. Evans, yielded only 3.55 per cent. of pure morphia, while good opium is said to furnish from 9 to 14 per cent. (*Am. Journ. of Pharm.* vii. 6.) We have been informed by a respectable druggist of Philadelphia, that the Constantinople opium is most highly esteemed in our markets, as it is less apt to be mingled with obvious impurities. It will have been observed that Guibourt experimented with good specimens of each variety; and it is probable, that, though the opium which is here sold under the name of Smyrna opium, may from its frequent adulterations be on the whole inferior to the Constantinople, it may, nevertheless, contain pieces of greater strength and value.

Under the name of Persia opium, a variety of this drug exists in the London market, and has occasionally, though rarely, found its way to this country. A specimen sent to M. Guibourt from London is described as being in cylindrical pieces about 4 inches long and half an inch thick, of a reddish colour internally, a uniform texture, and a virose, musty smell. (*Journ. de Pharm.* xxi. 200.) From the report of a trial in the city of New York, published in the Journal of Commerce, it appears, that a parcel of Persia opium imported into that city from London in August last, was in small round balls, and contained only 3 per cent. of morphia. It is highly important that the real value of these commercial varieties of opium should be known to the physician and apothecary, as otherwise, there can be no certainty in relation to the strength of the preparations which may be made from them. In the preparation of laudanum and the other tinctures into which opium enters, it is understood that the drug employed should have the average quality of good Smyrna opium. The inferior kinds should be used only for the extraction of morphia.

shining fracture, and affording when pulverized a yellowish-brown powder, which becomes adhesive upon a slight elevation of temperature. It readily inflames upon the application of a lighted taper. It is partially soluble in water, alcohol, ether, wine, vinegar, and lemon juice, to all which it imparts a deep brown colour. We are told, that when it is triturated with hot water, five parts out of twelve are dissolved, six suspended, and one remains unaffected. (*A. T. Thomson.*) This is viscid and tenacious, presenting characters strongly analogous to those of caoutchouc. Pelletier states that the proportion of opium taken up by water varies in all specimens. He never found the quantity of extract prepared with cold water to exceed 12 parts out of 16. (*Journ. de Pharm. Nov.* 1832.)

Much attention has been devoted to the chemical constitution of opium; and very interesting results have been obtained. It was by their researches into the nature of this substance that chemists were led to the discovery of those vegetable alkaloids, which, as the active principles of the plants in which they are found, have recently attracted so much attention among physicians, and been applied so advantageously to the treatment of disease. To Sertürner, an apothecary at Eimbeck, in Hanover, certainly belongs the credit of having opened this new and most important field of experiment. In the year 1803, M. Derosne made known the existence of a crystallizable substance which he had discovered in opium, and which he erroneously believed to be the active principle. In the following year, Seguin discovered another crystallizable body, which subsequent experience has proved to be the true narcotic principle of opium; but he did not fully investigate its nature, and no immediate practical advantage was derived from his excellent analysis. About the same time, Sertürner was engaged in a similar investigation, the results of which, very analogous to those obtained by Seguin, were published in a German journal, without, however, attracting general attention. In this state the subject remained till the year 1817, when Sertürner announced the existence of a saline compound in opium, consisting of a peculiar alkaline principle united with a peculiar acid, and clearly demonstrated the precise nature of a substance, which, though before discovered both by Seguin and by himself, had been hitherto but vaguely known. To the alkali, in which he correctly conceived the narcotic powers of the opium to reside, he gave the name of *morphium*, which has been subsequently changed to *morphia* by English writers, in order to render it analogous to the titles of the other alkalies. The acid he called *meconic*, a term derived from the Greek name of the poppy. The correctness of the statements of Sertürner was confirmed by the experiments of Robiquet, who also satisfactorily demonstrated that the substance obtained by Derosne, and called by him *the salt of opium*, was a principle altogether distinct from the morphia, though supposed to possess very considerable influence over the system. In the belief of its narcotic powers, Robiquet denominated it *narcotin*, a title which it still retains. Several other peculiar principles have since been discovered; though it is difficult to resist the impression that some of them may be the result of the processes to which opium is submitted for their extraction. According to the views of its constitution at present admitted, opium contains 1. morphia; 2. narcotin (narcotina); 3. codein (codeia); 4. meconin; 5. narcein (narceia); 6. meconic acid; 7. a peculiar acid, not yet fully investigated; 8. extractive matter; 9. gum; 10. bassorin; 11. a peculiar resinous body insoluble in ether and containing nitrogen; 12. fixed oil; 13. a substance resembling caoutchouc; 14. an odorous volatile principle; besides a considerable quantity of vegetable remains, and a small proportion of acetic acid, sulphate of lime, sulphate of potassa, alumina, and iron.

Of these constituents *morphia* is by far the most important. Though generally admitted to exist in opium united with meconic acid in the state of meconate, it is also intimately associated with the extractive matter, according to the statement of M. Fauré, who found that the meconic acid of opium was alone insufficient to saturate all the morphia. By this experimenter, the morphia, meconic acid, and extractive, are believed to exist in chemical combination; and hence the meconate cannot be obtained separate from the last mentioned principle. (*Journ. de Pharm.* xv. 571.) Of morphia and the mode of procuring it, and of its salts, we shall treat at large under the head of the pharmaceutic preparations. (See *Morphia.*)

Narcotina is solid, white, tasteless, inodorous, crystallizable in silky flexible needles, usually larger than the crystals of morphia, fusible at a moderate elevation of temperature, insoluble in cold water, soluble in 400 parts of boiling water, in 100 parts of cold and 24 of boiling alcohol which precipitates it upon cooling, and very soluble in ether. The fixed and volatile oils also dissolve it. It exerts no alkaline reaction upon vegetable colours, but is dissolved by most of the acids, and with some of them forms definite compounds, which may be obtained in a separate state, and deserve to be considered as genuine salts. It must, therefore, be ranked among the vegetable alkalies. Robiquet states that he has obtained the sulphate and muriate of narcotina well crystallized. (*Journ. de Pharm.* xvii. 639, and xix. 59.) With acetic acid, however, it does not appear, according to the observation of Pelletier, to form a permanent combination; for though dissolved by cold acetic acid, it is separated by exposing the solution to heat. Though narcotina itself is tasteless, its salts are very bitter, even more so than those of morphia. (*Berzelius.*) They are all soluble in water, and in consequence of the weak neutralizing power of the base, redden litmus paper. Narcotina is precipitated by the alkalies from its solution in the diluted acids. It may be distinguished from morphia by its insipidity and its solubility in ether, by assuming a yellowish instead of a blood-red colour under the action of strong nitric acid, and by not producing, either pure or in the saline state, with the salts of iron, the blue colour which characterizes morphia and its salts. Water extracts it from opium in consequence of the acid which the latter contains, either free or combined with the narcotina; but the diluted acids extract it with greater facility. It is always obtained mixed with morphia in the processes for procuring this principle; and may be separated by the action of sulphuric ether, which dissolves it without affecting the morphia, and yields it upon evaporation. It may also be obtained by digesting opium or its aqueous extract in sulphuric ether, evaporating the ether, treating the residue of the evaporation with boiling water and animal charcoal, filtering, precipitating with ammonia, and purifying the precipitate if necessary, either by solution in hot alcohol which deposites it on cooling, or by solution in muriatic acid, digestion with animal charcoal, filtration, and precipitation by ammonia. In this process the ether takes up, besides the natural salt of narcotina, a fixed oil from the extract, and in addition, caoutchouc and resin from the opium. These are left behind by the water; and the salt of narcotina is decomposed by the ammonia. This at least is the explanation given by Berzelius; but Pelletier and Robiquet maintain that narcotina exists uncombined in opium; and according to the former of these chemists, though a small portion of narcotina, in the above process, is dissolved by water from the ethereal extract, this is owing to the presence of a little free acid; and a much larger proportion of the principle remains in the extract undissolved. (*Journ. de Pharm.*) Another mode of procuring narcotina is to treat opium, which has been exhausted by previous maceration in water, with acetic acid, filtering the solution, precipitating by an alkali, washing the precipitate with water, and purifying it by means of boiling alcohol, as in the former instance. Should it still be impure, the solution in alcohol and crystallization may be repeated.

Different opinions have been advanced relative to the action of narcotina on the system. Derosne believed it to be the active principle of opium; though upon experimenting with it, he obtained effects but little stronger than those produced by an equal dose of opium itself. Magendie found it to exercise a powerful influence upon the system of dogs. One grain dissolved in oil was sufficient to throw the animal into a state of stupor, which terminated in death in the course of twenty-four hours. This stupor was wholly different from the composed sleep produced by morphia and its preparations. He inferred, that while the latter principle exercises the remedial, anodyne, and soporific virtues of opium, the injurious excitant operation of the medicine is ascribable to the narcotina. Both Derosne and Magendie found its unpleasant effects to be modified or prevented by its conjunction with acetic acid. According to Magendie, twenty-four grains, dissolved in vinegar, may be given to a dog without destroying life. M. Baily prescribed it in the dose of sixty grains, both in the solid state and dissolved in muriatic acid, without observing from it any sensible effect. In the same state, Orfila found that it might be taken by man in very large doses with impunity; and thirty grains of it dissolved in acetic acid, produced no effect upon several patients to whom it was administered. Upon dogs, he informs us, that it is without action when dissolved in nitric or muriatic acid; but held in solution by acetic or sulphuric acid, or by olive oil, thirty or forty grains of it were sufficient to produce fatal effects. A singular circumstance noticed by the same experimenter is, that the solution in acetic or sulphuric acid occasioned violent excitement; while the contrary condition uniformly resulted from the use of that in olive oil. On the whole, we may conclude that narcotina is nearly inoperative upon the human system, either in the solid form or dissolved in acids; and that the narcotic effects which have been attributed to it, have probably arisen from the employment of a preparation not entirely freed from other principles contained in the opium. It may be considered as certain, that substances differing in some respects have been obtained and described under the name of narcotina; for the most skilful analytical chemists of the age have given statements of its composition wholly irreconcilable with each other, and to be accounted for only upon the supposition that they did not experiment on precisely the same body. Thus Pelletier and Dumas found 7.21 per cent. of nitrogen, and Liebig only 2.51 per cent. Perhaps the discovery of the new principles in opium may throw some light on this subject. Narcotina is composed, according to an analysis conducted with great care by Pelletier, of 65,16 parts of carbon, 4.31 of nitrogen, 5.45 of hydrogen, and 25.08 of oxygen. (*Journ. de Pharm.* xviii. 624.) According to Robiquet, its muriate consists of 4.585 parts of narcotina, and 0.409 parts of dry acid. (*Ibid.* xix. 63.)

Codeia was discovered in 1832 by Robiquet in the muriate of morphia prepared according to the process of Gregory. It exists in opium combined like morphia with meconic acid, and is extracted along with that alkali in the preparation of the muriate. (See *Morphia.*) When the solution of the mixed muriates of morphia and codeia is treated with ammonia, the former alkali is precipitated, and the codeia, remaining in solution, may be obtained by evaporation and crystallization. It may be purified by treating the crystals with hot ether, which dissolves them and yields the codeia in colourless crystals by spontaneous evaporation. This alkaline product melts at 300°

without decomposition. It is soluble in water, which takes up 1.26 per cent. at 60°, 3.7 at 110°, and 5.9 at 212°. It is soluble also in alcohol and ether, but is insoluble in alkaline solutions. It combines with acids to form salts, some of which are crystallizable, particularly the nitrate. Its capacity of saturation is almost identical with that of morphia. According to Robiquet, 1 part of muriatic acid is saturated by 7.837 of codeia, and by 7.88 of morphia. It is distinguishable, however, from the latter principle, by the different form of its crystals, by its solubility in boiling ether, greater solubility in water, and insolubility in alkaline solutions, by affording a copious precipitate with tincture of galls, and by not assuming a red colour with nitric acid, nor a blue one with the persalts of iron. (*Journ. de Pharm.* xix. 91.) Its crystals contain about 6 per cent. of water, which is driven off at 212°. Mr. Gregory tried the effects of *nitrate of codeia* upon himself and several of his pupils, and found that, in a dose of three grains or less, it produced no obvious effect, but in the quantity of from four to six grains, accelerated the pulse, occasioned a sense of heat in the head and face, and gave rise to an agreeable excitement of the spirits like that resulting from intoxicating drinks, which was attended with a sense of itching upon the skin, and after lasting for several hours, was followed by an unpleasant depression, with nausea and sometimes vomiting, No tendency to sleep was observed, except in the state of depression. In two or three cases the medicine produced a slight purgative effect; but in others it appeared to exercise no peculiar influence on the bowels. M. Barbier of Amiens administered codeia *uncombined* in numerous cases, and observed that, in the dose of one or two grains, it acted on the nervous system, and appeared to be directed especially to the nervous plexus of the great sympathetic, as it relieved painful affections having their origin apparently in disorders of this plexus, while it exerted no influence over pains of the back and extremities supplied by nerves from the spinal marrow. He did not find it to affect the circulation, to disturb digestion, or to produce constipation. In sufficient quantity, it induced sleep, without occasioning those marks of cerebral congestion induced by opium. On the whole, there can be no doubt that this principle has a decided action on the animal economy, and is among those upon which opium depends for its peculiar powers.

Meconin, the existence of which was announced in 1832 by M. Couerbe, is identical with a substance discovered several years previously by M. Dublanc, jun., but of which no account was published. It is perfectly white, in the form of acicular crystals, soluble in about 265 parts of cold and 18 of boiling water, very soluble in ether, alcohol, and the essential oils, fusible at 195°, volatilizable without change, wholly destitute of nitrogen in its composition, and possessed of a degree of acrimony which favours the supposition that it may not be without action upon the system. It is neither acid nor alkaline. Meconin is obtained by precipitating the aqueous infusion of opium with ammonia, washing the precipitate with water until the latter nearly ceases to acquire colour, mixing the watery fluids, evaporating them to the consistence of molasses, setting them aside for fifteen days or three weeks, during which a mass of granular crystals is formed, then decanting the liquid, expressing the mass, and drying it with a gentle heat. The meconin may be separated from the mass by treating it with boiling alcohol of 36° Baumé, evaporating so as to obtain crystals, dissolving these in boiling water with animal charcoal, filtering the liquor while hot, and subjecting the crystals which form upon the cooling of the solution to the action of ether, which dissolves the meconin, and yields it in a state of purity by spontaneous evaporation. (*Journ. de Pharm., Decemb.* 1832.)

Narceia, discovered by Pelletier in 1832, is white, in silky acicular crystals, inodorous, of a slightly bitter taste, fusible at 197° F., soluble in 375 parts of cold and 230 of boiling water, soluble also in alcohol, and insoluble in ether. It is rendered blue by the action of mineral acids so far diluted as not to decompose it; but does not, like morphia, become blue by the action of the salts of iron, nor red by that of nitric acid. It combines with but does not neutralize the acids, in this respect corresponding with narcotina. Its constituents are carbon, hydrogen, nitrogen, and oxygen. Pelletier obtained it in the course of his analysis of opium. Having formed an aqueous extract of opium, he treated it with distilled water, precipitated the morphia by ammonia, concentrated the solution, filtered it, threw down the meconic acid by baryta water, separated the excess of baryta by carbonate of ammonia, drove off the excess of the ammoniacal salt by heat, evaporated the liquor to the consistence of syrup, set it aside till a pulpy matter formed containing crystals, separated and expressed this pulpy matter, then treated it with alcohol, and concentrated the alcoholic solution. This, upon cooling, deposited crystals of *narceia*, which were easily purified by repeated solution and crystallization. When mixed with meconin, which often crystallizes with it, the latter may be separated by the agency of ether. It may be doubted whether these two substances really exist in opium, or are formed by the mutual reaction of other principles, during the process by which they are procured.

Meconic acid is white, solid, crystallizable, fusible at about 220° F., volatilizable without change, of a sour taste followed by bitterness, soluble in water and alcohol, with the property of reddening vegetable blues, and of striking a blood-red colour with the salts of iron. This last property is characteristic. The following is Robiquet's process for obtaining the acid. An infusion of opium is boiled, for fifteen or twenty minutes, with a quantity of caustic magnesia equal to about two per cent. of the opium employed, and then filtered; the matter deposited on the filter containing meconate of magnesia, morphia, &c., is washed with cold distilled water, and having been treated first with diluted alcohol, and afterwards with concentrated alcohol, to separate the colouring matter and morphia, is submitted to the action of very weak sulphuric acid with heat; the acid liquor is precipitated with solution of muriate of baryta, which throws down the meconate and sulphate of baryta, contaminated with colouring matter; the precipitate is washed and macerated with weak sulphuric acid, to separate the baryta from the meconic acid which is now dissolved; the liquor is filtered and concentrated by evaporation; and lastly the acid, which separates in the form of a reddish-yellow mass, is taken from the mother waters, washed with a small quantity of cold water, dried, and freed from the colouring matter by sublimation. Meconic acid is not used separately in medicine; but its natural relation with morphia requires that it should be understood.

The remarks which have hitherto been made on the physical properties and composition of opium, have reference to the variety procured from Turkey. The *India* opium, according to Dr. A. T. Thomson, is distinguished by the following characters. It is in round masses, covered with the petals of the poppy in successive layers, to the thickness of nearly one-fourth of an inch. It has a strong empyreumatic smell, with little of the peculiar heavy odour of the Turkey opium. Its taste is more bitter, and equally nauseous, but less acrid. Its colour is blacker, and its texture, though as tenacious, is less plastic. It is more friable, and when triturated with water, is wholly suspended or dissolved, leaving none of that plastic residue which is afforded by the other variety. It yielded to Dr. Thomson more narcotina than the Turkey opium, but only about one-third the quantity of morphia. It appears to us highly probable, from the characters of India opium detailed by Dr. Thomson, that the specimens he examined were, in fact, rather the extract of the poppy heads obtained by decoction, than the inspissated juice; for we cannot conceive that there should be so essential a difference between the genuine opium of India and that of Turkey, while the latter agrees almost precisely with that produced in England and France. The absence of the plastic principle analogous to caoutchouc, is a strong evidence in favour of this opinion; for it is obvious that water would not extract this from the capsules, while it is hardly probable that the juice is destitute of it. Besides, the strength of India opium, as above described, is very nearly the same with that of the extract of the capsules prepared in France. The best opium used in India is undoubtedly a very different substance; and we have been thus particular, in order that, should any of it reach us, we might be prepared to value it by its intrinsic merits, not by the reputation which it has acquired in books, and which is maintained by the habit among authors of copying each other's statements without due examination. Indeed, we find it stated in the *Journal de Pharmacie* for May, 1835, that a sample of India opium possessed by Dr. Christison of Edinburgh, yielded to him nine and a half per cent. of muriate of morphia, which very nearly equals the product of good Turkey opium.

Incompatibles. All the substances which produce precipitates with opium, do not necessarily affect its medical virtues; but the *alkalies*, and all vegetable infusions containing tannin and gallic acid, are strictly incompatible; the former separating and precipitating the active principle, the latter forming with it an insoluble compound.

The proportion of morphia which any particular specimen of opium will furnish, may be considered as the best test of its value, except that of actual trial upon the system. Good opium should yield ten or twelve per cent. of the impure morphia precipitated from the infusion by ammonia with alcohol according to the process of the United States Pharmacopœia. (See *Morphia.*)

The London College judiciously directs that opium, before being used, be carefully separated from all foreign substances, especially those which are external. The College also directs that it should be kept in two states —*soft*, fit to form pills; and *hard*, by drying it with the aid of a water-bath, so that it may be pulverized.

Medical Properties and Uses. Opium is a stimulant narcotic. Taken by a healthy person, in a moderate dose, it increases the force, fulness, and frequency of the pulse, augments the temperature of the skin, invigorates the muscular system, quickens the senses, animates the spirits, and gives new energy to the intellectual faculties. Its operation, while thus extending to all parts of the system, is directed with peculiar force to the brain, the functions of which it excites sometimes even to intoxication or delirium. In a short time this excitation subsides; a calmness of the corporeal actions, and a delightful placidity of mind succeed; and the individual, insensible to painful impressions, forgetting all sources of care and anxiety, submits himself to a current of undefined and unconnected, but pleasing fancies; and is conscious of no other feeling than that of a quiet and vague enjoyment. At the end of half an hour or an hour from the administration of the narcotic, all consciousness is lost in sleep. The soporific effect, after having continued for eight or ten hours, goes off, and is generally succeeded by more or less nausea, headach, tremors, and other symptoms of diminished or irregular nervous action, which soon yield to the recuperative energies of the system; and unless the dose be frequently repeated, and the powers of nature worn out by over-excitement, no injurious consequences ultimately result. Such is the obvious operation of opium when moderately taken; but other effects, very important in a remedial point of view, are also experienced. All the secretions, with the exception of that from the skin, are either suspended or diminished; the peristaltic motion of the bowels is lessened; pain and inordinate muscular contraction, if present, are allayed; and general nervous irritation is composed, if not entirely relieved.

When large doses are taken, the period of excitement and exhilaration is shorter; the soporific and anodyne effects are more intense and of longer duration; and the succeeding symptoms of debility are more obvious and alarming.

In quantities sufficient to destroy life, opium scarcely produces any sensible increase of the general powers of the system, but almost immediately reduces the frequency, though not the force of the pulse, diminishes muscular strength, and brings on languor and drowsiness, which soon eventuate in a deep apoplectic sleep. A stertorous respiration; a dark suffusion of the countenance; a full, slow, and labouring pulse; an almost total insensibility to external impressions; and—when a moment of consciousness has been obtained by violent agitation, or powerfully irritating applications—a confused state of intellect, and an irresistible disposition to sink back into comatose sleep, are symptoms which, for the first few hours, attend the operation of the poison. Though not signs of an elevated condition of the bodily powers, neither do they imply a state of pure, unmixed debility. The pulse is, indeed, slow; but it is often so full, and so powerful in its beat, that the practitioner feels himself obliged to use the lancet. In the space, however, of a few hours, varying according to the quantity of the narcotic taken, and the powers of the patient's constitution, a condition of genuine debility ensues; and this condition will be hastened in point of time, though it will be more under the control of remedies, if the opium be removed artificially from the stomach. Called to an individual labouring under the influence of a fatal dose of opium, at a period from six to eight hours after it has been swallowed, the practitioner will generally find him with a cool, clammy skin; cold extremities; a pallid countenance; a feeble, thread-like, scarcely perceptible pulse; a slow, interrupted, almost gasping respiration; and a torpor little short of absolute, deathlike insensibility. With such symptoms, the patient is usually beyond the reach of assistance: the poison has worked its fatal effects; and the last convulsive struggle of the system may be every moment expected.

No appearances are revealed by the dissection of those who have died of the immediate effects of opium, which can be considered as affording satisfactory evidence of its mode of operation. The redness occasionally observed in the mucous membrane of the stomach, is by no means constantly present, and is ascribable rather to the irritating substances prescribed as remedies, or to the spirituous vehicle in which the poison has been swallowed, than to the action of the poison itself. Such at least is the inference drawn by Nysten from his experiments and observations; and Orfila states that the stomachs of dogs which he had killed by opium internally administered, did not present the slightest vestige of inflammation. The force of the medicine is directed to the cerebral and nervous functions; and death is produced by a suspension of respiration arising from the want of due influence from the brain. The section of the par vagum on both sides has not been found to prevent or retard the death of animals to which large doses of opium have been given, nor even materially to modify its narcotic effects.*

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* Nysten, quoted by Orfila.

It would seem, therefore, that the active principle is conveyed into the circulation, and operates upon the brain, and probably upon the nervous system at large, by immediate contact with their interior structure. It is an error to attribute the anodyne, sedative, and soporific effects of the medicine to the previous excitement. They are, as much as this very excitement, the direct results of its action upon the brain. It is in the state of exhaustion and collapse which ensue after the peculiar influence of the opium has ceased, that we are to look for an illustration of that principle of the system, by which any great exaltation of its energies above the natural standard is followed by a corresponding depression. We may be permitted to advance the conjecture, that the excitement which almost immediately supervenes upon the internal use of opium, is produced by means of nervous communication; while the succeeding narcotic effects are attributable to its absorption and entrance into the circulation; and the prostration of all the powers of the system which ultimately takes place, is a necessary consequence of the agitation into which the various organs have been thrown.

On some individuals opium produces very peculiar effects, totally differing from the ordinary results of its operation. In very small quantities it occasionally gives rise to excessive sickness and vomiting, and even spasm of the stomach; in other cases it produces restlessness, headach, and delirium; and we have known it, even in large doses, to occasion obstinate wakefulness. The headach, want of appetite, tremors, &c., which usually follow, in a slight degree, its narcotic operation, are uniformly experienced by some individuals to such an extent, as to render the use of the medicine very inconvenient. It is possible that some of these disagreeable effects may arise not from the meconate of morphia contained in the opium, but from some other of its ingredients; and those which do result from the meconate, may not be produced by other salts of morphia. It has, in fact, been found that the operation of opium may often be favourably modified by changing the state of combination in which its active principle naturally exists. Dissolved in vinegar or lemon juice, it had been known to act in some instances more pleasantly and effectually than in substance, or in the state of tincture, long before physicians had learned to explain the phenomenon by referring it to the production of an acetate or citrate of morphia. When upon the subject of morphia, we shall take occasion to treat of the medical properties of this principle in its various combinations.

An occasional effect of opium, which has not yet been alluded to, is a disagreeable itching or sense of pricking in the skin which is sometimes attended with a species of miliary eruption. We have found the effect to result equally from all the preparations of this narcotic.

The general operation of opium may be obtained by injecting it into the rectum, or applying it to the surface of the body, especially upon a part denuded of the cuticle. It has appeared to us, when thus applied, to produce less general excitement, in proportion to its other effects, than when administered by the mouth; but we do not make the statement with entire confidence. It is said that when introduced into the cellular membrane, it acts with great energy; and when thrown into the cavity of the peritoneum speedily produces convulsions and death. Injected into the cavity of the heart, it impairs, or altogether destroys the powers of this organ.

The local effects of opium are of a similar character with those which follow its general operation. An increased action of the part is first observable; then a diminution of its sensibility and contractility; and the latter effect is more speedy, more intense, and of longer continuance, the larger the quantity in which the narcotic is applied.

In all parts of the world, opium is habitually employed by many with a view to its exhilarating and anodyne influence. This is particularly the case among the Mahomedans and Hindoos, who find in this narcotic the most pleasing substitute for those alcoholic drinks which are interdicted by the precepts of their religion. In India, Persia, and Turkey, it is consumed in immense quantities; and many nations of the East smoke opium as those of the West smoke tobacco. This is not the place to speak of the fearful and blasting effects of such a practice upon both the intellectual and bodily faculties.

The use of opium as a medicine can be clearly traced back to Diagoras, who was nearly contemporary with Hippocrates; and it was probably employed before his time. It is at present more frequently prescribed than perhaps any other article of the materia medica. Its extensive applicability to the cure of disease, will be rendered evident by a view of the indications which it is calculated to fulfil. 1. It is excitant in its primary action. In low or typhoid complaints, requiring a supporting treatment, it exalts the actions of the arterial and nervous systems, and in moderate doses frequently repeated, may be employed with advantage in conjunction or alternation with other stimulants. 2. It relieves pain more speedily and effectually than any other medicine with which we are acquainted. If possessed of no other property than this, it would be entitled to high consideration. Not to mention cancer, and those other incurable affections, which, if not alleviated by opium, would render the remainder of life a scene of continued torture; we have numerous instances of painful diseases which are not only temporarily, but entirely cured by the remedy; and there is scarcely a complaint in the catalogue of human ailments, in the treatment of which it is not occasionally demanded for the relief of suffering, which, if allowed to continue, might aggravate the disorder, and protract, if not prevent a cure. 3. Another very important indication, which, beyond any other narcotic, it is capable of fulfilling, is the production of sleep. For this purpose it is given in a great variety of diseases—whenever, in fact, morbid vigilance exists, not dependent on acute inflammation of the brain. Among the complaints in which it proves most serviceable in this way, is the delirium tremens, or mania of drunkards, in which it is frequently sufficient of itself to effect a cure. Opium produces sleep in two ways; first, by its direct operation on the brain, secondly, by allaying that morbid nervous irritation upon which wakefulness generally depends. In the latter case it may frequently be advantageously combined with camphor or Hoffman's anodyne. 4. Opium is powerfully antispasmodic. No medicine is so efficient in relaxing spasm, and in controlling those irregular muscular movements which depend on unhealthy nervous action. Hence its great importance as a remedy in tetanus; colic; spasm of the stomach attending gout, dyspepsia, and cholera; spasm of the ureters in nephritis, and of the biliary ducts in the passage of calculi; and in various convulsive affections. 5. Probably dependent upon a similar influence over the nervous system, is the property which it possesses of allaying general and local irritations, whether exhibited in the nerves or blood-vessels, provided the action do not amount to positive inflammation; and even in this case it is sometimes prescribed with advantage. Hence its use in composing restlessness, quieting cough, and relieving nausea, tenesmus, and strangury. 6. In suppressing morbid discharges, it answers another indication which fits it for the treatment of a long list of diseases. This effect it is, perhaps, enabled to produce by diminishing the nervous energy upon which secretion and muscular motion depend. Upon this principle it is useful in diarrhœa, when the complaint consists merely in increased secretion into the bowels, without high action or organic derangement; in consumption, chronic catarrh, humoral asthma, and other cases of morbidly increased expectoration; in diabetes; and in certain forms of hemorrhage, particularly that from the uterus, in combination with other remedies. 7. It remains to mention one other indication—that of producing perspiration—in fulfilling which opium, conjoined with small doses of emetic medicines, is pre-eminent. No diaphoretic is so powerful as a combination of opium and ipecacuanha; and none is so extensively employed. We shall speak more fully of this application of the remedy under the head of *Pulvis Ipecacuanhæ et Opii.* It is here sufficient to say, that its beneficial effects are especially experienced in rheumatism, the bowel affections, and certain forms of pulmonary disease.

From this great diversity of properties, and the frequent occurrence of those morbid conditions in which opium affords relief, it is often prescribed in the same disease to meet numerous indications. Thus, in idiopathic fevers, we frequently meet with morbid vigilance and great nervous irritation, combined with a low condition of the system. In typhous pneumonia, there is the same depression of the vital powers, combined with severe neuralgic pains, and much nervous irritation. In diarrhœa, besides the indications presented by the spasmodic pain and increased discharge, there is a strong call for the diaphoretic operation of the opium. It is unnecessary to multiply instances. There is hardly a complaint which does not occasionlly present a complication of symptoms demanding the use of this remedy.

But a medicine possessed of such extensive powers may do much injury if improperly directed; and conditions of the system frequently occur, in which, though some one of the symptoms calls for its use, others, on the contrary, are incompatible with it. Thus, opium is contra-indicated by a high state of inflammatory excitement, which should be reduced before we can with propriety venture upon its employment; and when there is any doubt as to the sufficiency of the reduction, the opium should be given in combination with tartarized antimony or ipecacuanha, which modify its stimulant operation, and give it a more decided tendency to the skin. It is also contra-indicated by strong determination of blood to the head, and whenever constipation of the bowels is particularly to be avoided. When, however, the constipation depends upon intestinal spasm, as in colic, it is sometimes relieved by the antispasmodic action of the opium; and the binding effects of the medicine may generally be counteracted by the use of laxatives.

Opium is usually administered in substance or in tincture. In the former state it is given in the shape of pill, which, as a general rule, should be formed out of powdered opium, as it is thus more readily dissolved in the liquors of the stomach, and therefore operates more speedily and effectually, than when made, as it sometimes is, immediately from the plastic mass. There is no medicine of which the dose is more variable, according to the habits of the patient, the nature of his complaint, or the purpose to be effected. While in catarrh and diarrhœa, we often prescribe not more than one-fourth or one-third of a grain; in tetanus and some other nervous affections, it has been administered, without abating the violence of the symptoms, in the enormous quantity of two drachms in twenty-four hours; and in a case of cancer of the uterus, under the care of the late Drs. Monges and La Roche of this city, the quantity is stated to have been gradually increased, till the amount taken during one day, either in the shape of tincture or in substance, was equivalent to more than three ounces. The medium dose, in ordinary cases of disease, to produce the anodyne and soporific effects of the medicine, is one grain.

Opium may often be applied with great advantage by the rectum. In this way it operates most advantageously in cases of obstinate vomiting, of painful nephritic and uterine affections, of strangury from blisters, and of dysenteric tenesmus. It may be employed as a suppository, or in the form of enema made with laudanum and a small quantity of viscid liquid, as flaxseed tea, mucilage of gum Arabic, or starch prepared with hot water. The quantity, as a general rule, may be three times that administered by the mouth; but the relative susceptibility of the stomach and rectum in different persons, is not always the same; and the effects produced by the narcotic given by injection, are sometimes much greater than was anticipated. The practitioner, moreover, should take into consideration the previous habits of the patient. It is possible that, in an individual who has long been accustomed to take opium internally, and whose stomach will receive large doses with impunity, the rectum may not have lost, in a proportionate degree, its absorbing power or susceptibility; and that serious consequences might result by adhering, in such a case, to the general rule, as to the relative quantity to be given in the way of enema or suppository.

In some one of its liquid preparations, opium is often used externally as an addition to collyria in ophthalmia, to injections in gonorrhœa, and lotions in various complaints of the skin, and external pains, as those of gout and rheumatism. It is also used as a local anodyne in the state of powder, made into a plaster or cataplasm.

When opium has been taken in an overdose, the only effectual mode of relief is immediately to evacuate the stomach, either by means of the stomach-pump, or when this is not attainable, by the more active emetics, such as tartarized antimony, sulphate of zinc, or sulphate of copper, conjoined with ipecacuanha. Emetics are preferable to the stomach-pump, when opium has been swallowed in substance, as the capacity of the tube is insufficient to admit of the passage of the masses in which the poison is sometimes taken. The operation of the emetic should be promoted by a very free use of warm drinks, by irritating the fauces with a feather, by keeping the patient in motion, and, if the insusceptibility to the action of the remedy is very great, by dashing cold water upon the head and shoulders, thus counteracting, for a moment, the narcotic influence of the opium upon the brain, and enabling this organ to receive and transmit the necessary impressions. After the evacuation of the poison, the chief indication is to obviate the debility which generally supervenes, and which, in cases where the quantity of the narcotic has been large, or has remained long in the stomach, is sometimes alarming and even fatal. For this purpose, the carbonate of ammonia or the aromatic spirit of ammonia, with wine whey, may be employed internally, and sinapisms and stimulant frictions applied to the surface. The practitioner should not despair even if called at the last moment. The stomach-tube may be applied at any period; and it is possible that even without an evacuation of the stomach, a little assistance may enable the system to resist successfnlly the prostrating influence of the poison, if not taken in an overwhelming dose. Should all other measures fail, resort may be had to artificial respiration, by which the functions of the lungs and heart may possibly be sustained till the brain has struggled through its conflict with the narcotic, and is enabled to resume its natural action. Brodie has demonstrated that death from many of the narcotics results from a suspension of the cerebral influence necessary to sustain the respiratory function, and that the heart ceases to act in consequence of the cessation of respiration. If this can be restored artificially before the contractions of the heart have entirely ceased, the circulation may continue, and life be supported for a time without the interference of the brain, which now receives a supply of arterial blood, and is thus better enabled to rise above the repressing action of the opium. As this narcotic does not produce a structural derangement, but operates chiefly upon the nervous power, a favourable result is more likely to be experienced than in cases of poisoning from some other articles of the same class. A case is on record, in which a child, apparently in the very last stage, was saved by a resort to artificial respiration.*

It is often desirable to ascertain the presence of opium in any suspected mixture. A test proposed by Dr. Hare, Professor of Chemistry in the University of Pennsylvania, though not to be relied on with absolute certainty, may be advantageously resorted to as an auxiliary to other means. It is founded on the fact that meconic acid forms a red salt with the peroxide of iron. Dr. Hare precipitates the meconate of lead by the addition of a few drops of a solution of the acetate of lead to the suspected liquid; applies to the precipitated meconate by means of a dropping-tube, about thirty drops of sulphuric acid, by which the meconic acid is separated; and finally adds in the same way a solution of the red sulphate of iron, which gives the striking red colour of the permeconate of that metal. By this mode a drop of laudanum may be detected in six fluidounces of water.† Orfila states that this test may be much simplified. All that is necessary is to separate the meconic acid from its native combination, and then combine it with the peroxide of iron. This may be accomplished by first adding sulphuric acid, and afterwards the ferruginous persulphate. Even the persulphate of iron alone will, according to Orfila, strike a red colour with a solution of opium, owing to its excess of acid.‡ It is obvious that the meconic acid only is detected; but as this has not been found in any other substance than opium, the presumptive evidence afforded by the test is strong.

Off. Prep. Acetum Opii, *Dub.;* Confectio Opii. *U. S.*, *Lond.*, *Ed.;* Electuarium Catechu Comp., *Ed.*, *Dub.;* Emplastrum Opii, *Lond.*, *Ed.*, *Dub.;* Extractum Opii, *Lond.*, *Dub.;* Morphia, *U.S.;* Pilulæ Opii, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Pulvis Cornu Usti cum Opio, *Lond.;* Pulvis Cretæ Compositus cum Opio, *Lond.;* Pulvis Ipecac. et Opii, *U. S.*, *Lond.*, *Ed.*, *Dub.;* Pulvis Opiatus, *Ed.;* Tinctura Opii, *U.S.*, *Lond.*, *Ed.*. *Dub.;* Tr. Opii Acetata, *U.S.;* Tr. Opii Ammoniata, *Ed.;* Tr. Opii Camphorata, *U.S.;* *Lond.*, *Ed.*, *Dub.;* Tr. Saponis et Opii, *Ed.;* Trochisci Glycyrrhizæ cum Opio, *Ed.;* Vinum Opii, *U.S.*, *Lond.*, *Ed.*
W.

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OPOPONAX. *Dub.*

Opopanax.

"Pastinaca Opoponax. *Gummi Resina.*" *Dub.*

Off. Syn. OPOPONACIS GUMMI-RESINA. Pastinaca Oopoponax. Gummi-resina. *Lond.*

Opopanax, *Fr.;* Panax, Opopanax, *Germ.;* Opopanace, *Ital.;* Opopanaco, *Span.;* Jáwesheer, *Arab.;* Gäwsheer, *Pers.*

Pastinaca. *Sex. Syst.* Pentandria Digynia—*Nat. Ord.* Umbelliferæ.

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* The infant was ten days old, had received by mistake from twenty-five to thirty drops of laudanum intended for the mother, had completely lost the power of deglutition, was comatose, and had had several convulsions. Artificial respiration was sustained two or three hours. See case by Dr. Ogilvie, in the N. Am. Med. and Surg. Journ. vol. iii. p. 277.

† Note by Dr, Hare in the Philad. Journ. of the Med. and Phys. Sciences, vol. xiv. p. 77.

‡ Journ. de Chimie Médicale, Fevrier, 1828.

Gen. Ch. *Fruit* elliptical, compressed, flat. *Petals* involute, entire. *Willd.*

Pastinaca Opopanax. Willd. *Sp. Plant.* i. 1466; Woodv. *Med. Bot.* p. 122. t. 47. This species of parsnip, usually called *rough parsnip*, has a thick, yellow, fleshy, perennial root, which sends up annually a strong branching stem, rough near the base, about as thick as a man's thumb, and from four to eight feet in height. The leaves are variously pinnate, with long sheathing petioles, and large, oblong, serrate leaflets, of which the terminal one is cordate, others are deficient at their base upon the upper side, and the whole are hairy on their under surface. The flowers are small, yellow, and form large flat umbels at the termination of the branches.

The plant is a native of the Levant, and grows wild in the South of France, Italy, and Greece. When the base of the stem is wounded, a juice exudes, which, when dried in the sun, constitutes the opopanax of commerce. Some authors state that it is obtained from the root. A warm climate appears necessary for the perfection of the juice, as that which has been collected from the plant in France, though similar to opopanax, is of inferior quality. The drug is brought from Turkey. It is said to come also from the East Indies; but Ainslie states that he has never met with it in any Indian medicine bazaar.

It is sometimes in tears, but usually in irregular lumps or fragments, of a reddish-yellow colour, speckled with white on the outside, paler within, and when broken exhibiting white pieces intermingled with the mass. Its odour is strong, peculiar, and unpleasant; its taste bitter and acrid. Its sp. gr. is 1.622. It is inflammable, burning with a bright flame. In chemical constitution it is a gum-resin, with an admixture of other ingredients in small proportion. The results of its analysis by Pelletier were from 100 parts, 33.4 of gum, 42 of resin, 4.2 of starch, 1.6 of extractive, 0.3 of wax, 2.8 of malic acid, 9.8 of lignin, 5,9 of volatile oil and loss, with traces of caoutchouc. Water by trituration dissolves about one-half of the gum-resin, forming an opaque milky solution, which deposites resinous matter on standing, and becomes yellowish. Both alcohol and water distilled from it retain its flavour; but only a very minute proportion of oil can be obtained in a separate state.

Medical Properties and Uses. Opopanax was formerly employed as an antispasmodic and deobstruent, in hypocondriasis, hysteria, asthma, and chronic visceral affections, and as an emmenagogue in suppression of the menses; but it is now generally regarded as a medicine of very feeble powers, and in this country is scarcely ever used. Its dose is from ten to thirty grains.

W.

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ORIGANUM. *U.S.*

Origanum.

"Origanum vulgare. Herba. *The herb.*" *U. S.*

Off. Syn. ORIGANUM. Origanum vulgare. *Lond.*; ORIGANUM VULGARE. *Dub.*

Origan, *Fr.;* Gemeiner Dosten, Wohlgemuth, *Germ.;* Origano, *Ital.;* Oregano, *Span.*

ORIGANUM. *Sex. Syst.* Didynamia Gymnospermia.—*Nat. Ord.* Labiatæ.

Gen. Ch. *Strobile* four-cornered, spiked, collecting the calyces. *Corolla* with the upper lip erect and flat, the lower three-parted, with the segments equal. *Willd.*

Origanum vulgare. Willd. *Sp. Plant.* iii. 135; Woodv. *Med. Bot.* p. 344. t. 123. Origanum or *common marjoram* is a perennial herb, with erect, purplish, downy, four-sided, trichotomous stems, which rise about eighteen inches high, and bear opposite, ovate, entire, somewhat hairy leaves, of a deep yellowish-green colour. The flowers are numerous, of a pinkish-purple or rose colour, disposed in roundish, panicled spikes, and accompanied with ovate reddish bractes, longer than the calyx. This is tubular, and five-toothed, with nearly equal segments. The corolla is funnel-shaped. with the upper lip erect, bifid, and obtuse, the lower trifid, blunt, and spreading. The anthers are double, the stigma bifid and reflexed.

The plant is a native of Europe and America. In this country it grows along the road sides, and in dry stony fields and woods, from Pennsylvania to Virginia, and is in flower from June to October; but it is not very abundant, and is seldom collected for use. The oil, which is the part chiefly employed, is imported from Europe.

Properties. Common marjoram has a peculiar agreeable aromatic odour, and a warm, pungent taste. These properties it owes to a volatile oil, which may be separated by distillation. (See *Oleum Origani.*)

Medical Properties and Uses. It is gently tonic and excitant, and has been used in the form of infusion as a diaphoretic and emmenagogue, and externally as a fomentation; but it is at present scarcely employed.

Off. Prep. Oleum Origani, *U. S.*, *Lond.*, *Dub.* W.

ORIGANUM MAJORANA. Herba. *Dub.*

Sweet Marjoram.

Off. Syn. ORIGANI MAJORANÆ HERBA. *Ed.*

Marjolaine, *Fr.;* Majoran, Wurstkraut, *Germ.;* Maggiorana. *Ital.;* Mejorana, *Span.*

ORIGANUM. See ORIGANUM.

Origanum Majorana. Willd. *Sp. Plant.* iii. 137; Woodv. *Med. Bot.* p. 345. t. 124. This species of Origanum has a perennial root with numerous stems, which are woody, branching, four-sided, and a foot and a half high. The leaves are sessile, in pairs, ovate, obtuse, entire, downy, and of a pale green colour. The flowers are small, white, and appear successively between the bracteal leaves, which are numerous, and form round compact spikes, of which three or four are placed at the extremity of each peduncle. The corolla is funnel-shaped, with the upper lip erect and roundish, the under divided into three pointed segments.

Sweet marjoram grows wild in Portugal and Andalusia, and is cultivated as a garden herb in other parts of Europe and in the United States. Some authors, however, consider the *O. Majoranoïdes*, which is a native of Barbary, and closely allied to the *O. Majorana*, as the type of the sweet marjoram of our gardens.

This plant has a pleasant odour, and a warm, aromatic bitterish taste, which it imparts to water and alcohol. By distillation with water it yields a large proportion of volatile oil.

It is tonic and gently excitant, but is used more as a condiment in cookery than as a medicine. In domestic practice, its infusion is much employed by the vulgar to hasten the tardy eruption in measles and other exanthematous diseases.

Off. Prep. Oleum Volatile Origani Majoranæ, *Ed.;* Pulvis Asari Compositus, *Ed.*

W.

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OS. *U.S.*

Bone.

Off. Syn. OSSA. *Ed., Dub.*

Os, *Fr.;* Knochen, *Germ.;* Ossa, *Ital.;* Huesos, *Span.*

Bones are employed in several pharmaceutical processes, and those derived from the domestic quadrupeds, especially the ox, may be assumed as the kind intended for officinal use.

Properties, &c. They are solid, white substances, of a lamellated texture, constituting the skeleton of the superior orders of animals, of which they form the hardest and densest parts. They consist of a cellular tissue of organic matter, the cavities of which are filled up with certain earthy salts, to be mentioned presently. When subjected to destructive distillation, in close vessels, they are decomposed without alteration of shape, lose about three-sevenths of their weight, become brittle, and are converted into a black matter, containing the earthy salts of the bone, and constituting the species of animal charcoal called *bone-black.* (See *Carbo Animalis.*) The portions which distil over consist of the usual ammoniacal products derived from animal matter. (See *Ammoniæ Murias.*) When calcined in open vessels they lose more of their weight, and are converted into a white friable substance, consisting of the incombustible part, and called by the earlier chemists the *earth of bones.* Treated with boiling water, a small portion of the animal matter is dissolved, consisting of gelatin; but when acted on by water in a *Papin's digester*, the whole of the animal matter is taken up, and the earthy salts, deprived of their cement, crumble into powder, and become diffused through the solution. When subjected to the action of dilute muriatic acid, the gelatin and earthy salts are dissolved, and the bone softens without losing its shape, and becomes semitransparent and flexible. The portion which remains unattacked by the acid is animal matter, having the appearance of cartilage, and the chemical properties of coagulated albumen. This portion of bone is very nutritious, and has been prepared so as to form a wholesome aliment by M. d'Arcet. His process for obtaining it consists in digesting bones in weak muriatic acid for seven or eight days, occasionally renewing the acid, plunging them for a few moments in boiling water, and then subjecting them to a strong current of cold water. The pure animal matter thus procured is converted into cakes of gelatin, called *portable soup*, (*tablettes de bouillon*,) by dissolving in water, concentrating the solution until it gelatinizes, and drying the matter obtained.

Composition. The bones of different animals, and of the same animal at different ages, vary somewhat in their composition. Dry ox-bones, according to Berzelius, consist of cartilage 33.3, phosphate of lime 55.45, carbonate of lime 3.85, fluate of lime 2.90, soda, chloride of sodium, water, &c. 2.45, phosphate of magnesia 2.05 = 100. Fourcroy and Vauquelin's results give a larger quantity of animal matter and carbonate of lime, and a smaller of phosphate of lime. Human bones differ somewhat in the proportions of their constituents, and in containing traces of iron and manganese.

Uses. Bones are applied to numerous uses. Burnt to whiteness, they furnish phosphate of lime, employed to obtain other phosphates, *phosphoric acid*, and *phosphorus*. Subjected to destructive distillation, they yield *impure carbonate of ammonia*, and empyreumatic oil; and a carbonaceous residue is left, called *bone-black*. Calcined, pulverized, and washed, they form the material of which *cupels* are made. In a divided state, in the form of bone saw-dust, they form an excellent manure. Deprived of their earthy portion by weak acids, they furnish a nutritious substance, proper as an ingredient in broths, or for forming portable soup. By proper treatment with water they furnish gelatin, applicable not only to the purposes of common glue, but also to those of the finer sorts of gelatin, called isinglass, in making animal jellies, and for the fining of wines. (See *Ichthyocolla* and *Cornu Cervi Elaphi.*) The hoof-bones of the ox, when boiled with water, furnish a peculiar oil, called neats-foot oil. (See *Oleum Bubulum.*)

Off. Prep. Calcis Phosphas Præcipitatum, *Dub.*; Sodæ Phosphas, *Ed.*, *U.S.*, *Dub.*

B.

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OVUM. *Lond.*

Egg.

"Phasianus Gallus. Ova." *Lond.*

Œuf, *Fr.*; Ei, *Germ.*; Ovo, *Ital.*; Huevo, *Span.*

The common dunghill fowl is supposed to have come originally from India, where it is found in a wild state. It is now domesticated in almost all parts of the globe.

The egg, which is the only officinal product, consists of 1. an exterior covering called the shell; 2. a white, semi-opaque membrane, lining the internal surface of the shell; 3. the white; 4. the yolk. Other distinct parts are recognised by the comparative anatomist, but they have no peculiar interest for the practical physician or pharmaceutist.

1. The shell consists, according to Vauquelin, chiefly of carbonate of lime, with animal matter, and a minute proportion of phosphate of lime, carbonate of magnesia, oxide of iron, and sulphur. When exposed to a high degree of heat in the open air, the carbonic acid is driven off, the animal matter consumed, and lime is left nearly pure.

2. The membrane lining the shell appears to be of an albuminous nature.

3. The white—*albumen ovi*—is a glairy viscid liquid contained in very delicate membranes, without odour or taste, readily soluble in water, coagulable by the stronger acids, by alcohol, and by a heat of 160° F. Exposed in thin layers to a current of air it becomes solid, retaining its transparency and solubility in water. By coagulation it is rendered sapid, white, opaque, and insoluble. At a temperature of 212°, one part of it renders one thousand parts of water in which it has been dissolved opaque. It contains, according to Dr. Bostock, in one hundred parts, 85 of water, 12 of pure albumen, 2.7 of mucus or uncoagulable matter, and 0.3 of saline substances, including soda with traces of sulphur. The white of egg is precipitated by muriate of tin, muriate of gold, subacetate of lead, corrosive sublimate, and tannin. When kept in the fluid state it soon putrefies; but if carefully dried without coagulation it may be long preserved without change, and may be applied in a state of solution to the same purposes as in its original condition.

4. The yolk—*vitellus ovi*—is inodorous, of a bland oily taste, and forms a milky emulsion when agitated with water. It contains water, albumen, a mild fixed oil, and a colouring matter. By heat it is coagulated into a granular solid, which yields the oil by expression.

Medical Properties and Uses. Eggs are applied to various purposes in medicine and pharmacy. The shells powdered and levigated may be used beneficially as an antacid in diarrhœa. In common with oyster shells, they possess the advantage of uniting intimately animal matter with the carbonate of lime, the particles of which are thus more thoroughly isolated, and prove more acceptable to the stomach, than chalk in the finest state of division to which the latter can be brought by mechanical means. The dose and mode of preparation are the same with those of the oyster shell. (See *Testa.*)

The *white* of the egg is used chiefly for the clarification of liquids, which it effects by involving, during its coagulation, the undissolved particles, and carrying them with it to the surface. It is also the best antidote for corrosive sublimate, producing with that substance an inert compound of albumen and calomel. It is sometimes also used for the suspension of insoluble substances in water, but is inferior for this purpose to the yolk, and even to mucilage of gum Arabic. Agitated briskly with a lump of alum it coagulates, at the same time dissolving a portion of the alum, and thus forming an astringent poultice, which may be advantageously applied between folds of gauze over the eye, in some states of ophthalmia. (See *Cataplasma Aluminis.*)

The *yolk* in its raw state is thought to be laxative, and is a popular remedy in jaundice. If beneficial in this complaint, it is probably in consequence of affording a mild nutritious diet, acceptable to the stomach, and easily digested. In dyspepsia it is, from this cause, highly useful. Dr. Parrish, of Philadelphia, has found much advantage from recommending to his dyspeptic patients, the habitual use of the yolk of egg beat up with water and a little ginger. In pharmacy, the yolk is highly useful as an intermedium between water and insoluble substances, such as the balsams, turpentine, oils, &c. It is a mistake in our practitioners to recommend the white, instead of the yolk of eggs, in the preparation of emulsions.

Off. Prep. Cataplasma Aluminis, *Dub.;* Enema Terebinthinæ, *Dub.*

W.

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PAPAVERIS CAPSULÆ. *Lond.*

Poppy Capsules.

"Papaver somniferum. *Capsulæ maturæ.*" *Lond.*

Off. Syn. PAPAVERIS SOMNIFERI CAPSULÆ. *Ed.;* PAPAVER SOMNIFERUM. Capsulæ maturæ. *Dub.*

Poppy heads; Capsules des pavots, *Fr.;* Kupseln des weissen Mohns, *Germ.;* Capidel papavero, *Ital.;* Cabezas de amapola, *Span.*

See OPIUM.

In England the poppy is cultivated chiefly for its capsules, which are gathered as they ripen, and taken to market enclosed in bags. They are occasionally imported into this country; but as no effect is produced by them, which cannot be as readily obtained from opium, or some one of its preparations, they are little employed; and the framers of the United States Pharmacopœia did not consider them entitled to a place among the articles of the Materia Medica.

The dried poppy capsules vary in size from the dimensions of a small egg to those of the fist. They are of a spheroidal shape, flattened below, and surmounted by a crown-like expansion—the persistent stigma—which is marked by numerous diverging rays that rise somewhat above its upper surface, and appear to be prolongations of partial septa or partitions, proceeding along the interior circumference of the capsule from the top to the bottom. In the recent state, the seeds, which are very numerous, adhere to these septa; but in the dried capsule they are loose in its cavity. The capsules of the black poppy are smaller and more globular than those of the white; and contain dark instead of light-coloured seeds. There appears to be no essential difference in their properties. Both kinds, when fresh, are glaucous, but when dry, as directed in the Pharmacopœias, are of a dirty white or purplish-brown colour, have a consistence somewhat like that of paper, are without smell, and have little taste, unless long chewed, when they are decidedly bitter. Submitted to analysis, they are found to contain principles similar to those of opium, which they yield to water by decoction. They have been employed in France for producing morphia.

Medical Properties and Uses. Dried poppy heads, though analogous to opium in medical properties, are exceedingly feeble. They are sometimes employed in the form of decoction, as an external emollient and anodyne application; and in the shape of emulsion, syrup, or extract, are often used internally by European practitioners to calm irritation, promote rest, and produce generally the narcotic effects of opium.

Off. Prep. Decoctum Papaveris, *Lond.;* Extractum Papaveris, *Lond., Ed.;* Syrupus Papaveris, *Lond., Ed., Dub.* W.

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PETROLEUM. *Lond.*

Petroleum.

Off. Syn, BITUMEN PETROLEUM. *Ed.;* Petroleum. BITUMEN PETROLEUM. PETROLEUM BARBADENSE. *Dub.*

Barbadoes tar; Pétrole. Huile de Gabian, *Fr.;* Steinöl, *Germ.;* Petroleo, *Ital., Span.*

Petroleum belongs to a class of native inflammable substances, called *bitumens.* These are liquids or readily fusible solids, which emit when heated a peculiar smell, burn easily, and leave a very small carbonaceous residue. They are of two kinds, one liquid, called naphtha, the other solid, denominated asphaltum. *Naphtha* is a transparent, yellowish-white, very light and inflammable, limpid liquid, which is found abundantly in Persia. It consists exclusively of hydrogen and carbon. Oxygen not entering into its composition, it is advantageously employed for preserving potassium. During the formation of coal gas, an artificial naphtha is obtained, which by rectification is rendered equally light and limpid with the natural substance. Thus purified, it was discovered by Mr. James Syme of Edinburgh to possess the property of dissolving caoutchouc, and the solution has been usefully applied to the purpose of forming various surgical instruments of that material. It has also been employed by Mr. Mackintosh of Glasgow, for giving a thin coating of caoutchouc to cloth, to render it impermeable to moisture. *Asphaltum* is solid, black, dry, friable, and insoluble in alcohol. These two varieties of bitumen often exist in a state of mixture in nature. When the asphaltum predominates it takes the name of *maltha* or *mineral tar;* when the naphtha is in the larger proportion it is called *petroleum.*

Localities. Petroleum is found principally at Amiano in the Duchy of Parma, at Gabian in France, upon the borders of the Caspian Sea, in the kingdom of Ava, and in Barbadoes, Trinidad, and other West India islands. The wells of petroleum in Ava are said to produce four hundred thousand hogsheads annually. The petroleum from Barbadoes is designated as the officinal variety by the Dublin College.

In the United States petroleum is found in various localities, the principal of which are, on the Kenhawa in Virginia; near Scottsville in Kentucky; in Western Pennsylvania; on Duck Creek in Ohio; and on the shores of Seneka Lake in New York. That found in the latter locality is usually called in this country *Seneka oil*, and similar varieties of petroleum from other native sources are known by the same name.

Properties. Petroleum is a black, rather thick, nearly opaque, inflammable liquid, unctuous to the touch, and possessing a bituminous taste, and strong and tenacious odour. Its sp. gr. varies from 0.730 to 0.878. When subjected to distillation, it yields naphtha, and leaves a solid residue of asphaltum. The petroleum from Ava yielded to Dr. Christison half its bulk of very fine naphtha. It has not been analyzed; but probably consists of hydrogen, carbon, and oxygen.

Medical Properties and Uses. Petroleum is accounted a stimulating antispasmodic and sudorific. It is occasionally given in disorders of the chest, when not attended with inflammation; but is seldom employed as an internal remedy except in the West Indies. In Germany it has been extolled as a remedy for tape-worm. Schwartz's formula in such cases was a mixture of one part of petroleum with one aud a half parts of tincture of assafetida, of which forty drops were given three times a day. Externally petroleum is employed as a stimulating embrocation in chilblains, chronic rheumatism, affections of the joints, and paralysis. It is an ingredient in the popular remedy called *British oil.* The dose of petroleum is from ten to thirty minims, given in any convenient vehicle.

That variety of native petroleum called Seneka oil is used to a considerable extent as an external application in domestic practice. It is lighter coloured, thinner in consistence, and less sapid and odorous than the Barbadoes petroleum, and probably contains more naphtha than the latter. B.

PETROSELINUM. *U. S. Secondary.*

Parsley Root.

"Apium petroselinum. Radix. *The root.*" *U. S.*

Persil, *Fr.;* Petersilie, *Germ.;* Prezzemolo, *Ital.;* Perexil, *Span.*

Apium. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Umbelliferæ.

Gen. Ch. Fruit ovate, striated. *Involucre* one-leafed. *Petals* equal. *Willd.*

Apium Petroselinum. Willd. *Sp. Plant.* i. 1475; Woodv. *Med. Bot.* p. 118. t. 45. Parsley has a biennial root, with an annual, round, furrowed, jointed, erect, branching stem, which rises about two feet in height. The radical leaves are compound, pinnated in ternaries, with the leaflets smooth, divided into three lobes, and notched at the margin. In the cauline leaves, the segments of the leaflets are linear and entire. The flowers are small, pale yellow, and disposed in terminal compound umbels, with a one or two leaved general involucre, and partial ones composed of six or eight leaflets. The petals are five, roundish, and inflexed at their apex. The seeds are small, ovate, flat on one side, convex on the other, of a dark green colour, and marked with five longitudinal ridges. They have a strong, terebinthinate odour, and a warm aromatic taste.

The plant is a native of Sardinia and other parts of southern Europe and is cultivated every where in gardens. All parts of it contain an essential oil, to which it owes its medicinal virtues, as well as its use in seasoning. The root is the part directed by the Pharmacopœia, though the seeds are at least equally efficient.

The root is spindle-shaped, about as thick as the finger, externally white and marked with close annular wrinkles, internally fleshy and white, with a yellowish central portion. It has a pleasant smell, and a sweetish slightly aromatic taste; but loses these properties by long boiling, and by the action of time. It should be employed in the recent state.

Medical Properties and Uses. Parsley root is said to be aperient and diuretic, and is occasionally used in nephritic and dropsical affections, in connexion with more active medicines. It is highly recommended by Professor Chapman. The usual form of administration is that of strong infusion. W.

PHYTOLACCÆ BACCÆ. *U.S. Secondary.*

Poke Berries.

"Phytolacca decandra. Baccæ. *The berries*" *U. S.*

PHYTOLACCÆ RADIX. *U.S. Secondary.*

Poke Root.

"Phytolacca decandra. Radix. *The root.*" *U.S.*

PHYTOLACCA. *Sex. Syst.* Decandria Decagynia.—*Nat. Ord.* Phytolacceæ.

Gen. Ch. Calyx none. *Petals* five, calycine. *Berry* superior, ten-celled, ten-seeded. *Willd.*

Phytolacca decandra. Willd. *Sp. Plant.* ii. 822; Bigelow, *Am. Med. Bot.* i. 39; Barton, *Med. Bot.* ii. 213. This is an indigenous plant with a very large perennial root, often five or six inches in diameter, divided into two or three principal branches, soft, fleshy, fibrous, whitish within, and covered with a brownish cuticle. The stems, which are annual, frequently grow to the height of six or eight feet, and divide into numerous spreading branches. They are round, very smooth, of a green colour when young, but purple after the berries have ripened. The leaves are scattered, ovate oblong, entire, pointed, smooth, ribbed beneath, and supported on short footstalks. The flowers are numerous, small, and grow in long racemes, which are sometimes erect, sometimes drooping. The corolla consists of five ovate, concave petals, folding inwards, and of a whitish colour. The germ is green. There are ten stamens, and the same number of pistils. The raceme of flowers becomes a cluster of dark purple, almost black, shining berries, flattened above and below, and divided into ten cells, each of which contains one seed.

The poke is abundant in all parts of the United States, flourishing along fences, by the borders of woods, and especially in newly cleared and uncultivated fields. It also grows spontaneously in the North of Africa and the South of Europe, where, however, it is supposed to have been introduced from America. Its flowers begin to appear in July, and the fruit ripens in autumn. The magnitude of the poke-weed, its large rich leaves, and its beautiful clusters of purple berries, often mingled upon the same branch with the green unripe fruit, and the flowers still in bloom, render it one of the most striking of our native plants. The young shoots are much used as food early in the spring, boiled in the manner of spinage. The ashes of the dried stems and leaves contain a very large proportion of potassa, yielding, according to Braconnot, not less than forty-two per cent. of the pure caustic alkali. In the plant the potassa is neutralized by an acid closely resembling the malic, though differing from it in some respects. The leaves, berries, and root are used in medicine, but the two latter only are mentioned in the Pharmacopœia. The root abounds most in the active principles of the plant. It should be dug up late in November, cut into thin transverse slices, and dried with a moderate heat. As its virtues are diminished by keeping, a new supply should be procured every year. The berries should be collected when perfectly ripe, and the leaves about the middle of summer, when the footstalks begin to redden.

The *berries* contain a succulent pulp, and yield upon pressure a large quantity of fine purplish-red juice. They have a sweetish, nauseous, slightly acrid taste, with little odour. The colouring principle of their juice is evanescent, and cannot be applied to useful purposes in dyeing, from the difficulty of fixing it. Alkalies render it yellow; but the original colour is restored by acids. The juice contains saccharine matter, and after fermenting, yields alcohol by distillation.

The *dried root* is of a light yellowish-brown colour externally, very much wrinkled, and when in transverse slices, exhibits on the cut surface numerous concentric rings, formed by the projecting ends of fibres, between which the intervening matter has shrunk in the drying process. The structure internally in the older roots is firm and almost ligneous; the colour yellowish-white, alternating with darker circular layers. There is no smell; the taste is slightly sweetish, and at first mild, but followed by a sense of acrimony The active matter is imparted to boiling water and alcohol.

Medical Properties and Uses. Poke is emetic, purgative, and somewhat narcotic. As an emetic it is very slow in its operation, frequently not commencing in less than one or two hours after it has been taken, and then continuing to act for a long time upon both the stomach and bowels. The vomiting produced by it is said not to be attended with much pain or spasm; but narcotic effects have been observed by some physicians, such as drowsiness, vertigo, and dimness of vision. In over-doses it produces excessive vomiting and purging, attended with great prostration of strength, and sometimes with convulsions. It has been proposed as a substitute for ipecacuanha; but the slowness and long continuance of its action, and its tendency to purge, wholly unfit it for the purposes which that emetic is calculated to fulfil. In small doses it acts as an alterative, and has been highly recommended in the treatment of chronic rheumatism. The dose of the powdered root, as an emetic, is from ten to thirty grains; as an alterative, from one to five grains. A saturated tincture of the berries prepared with diluted alcohol may be given in rheumatic cases, in the dose of a fluidrachm three times a day. A strong infusion of the leaves or roots has been recommended in piles.

An ointment prepared by mixing a drachm of the powdered root or leaves with an ounce of lard, has been used with advantage in psora, tinea capitis, and some other forms of cutaneous disease. It occasions at first a sense of heat and smarting in the part to which it is applied. An extract made by evaporating the expressed juice of the recent leaves has been used for the same purpose, and acquired at one time considerable repute as a remedy in cancer.

W.

PIMENTA. *U.S.*

Pimento.

"Myrtus pimenta. Baccæ. *The berries.*" *U.S.*

Off. Syn. PIMENTÆ BACCÆ. Myrtus Pimenta. Baccæ. *Lond.;* MYRTI PIMENTÆ FRUCTUS, *Ed.;* PIMENTA. MYRTUS PIMENTA. Fructus. *Dub.*

Allspice, Jamaica pepper; Piment, Poivre de la Jamaique, *Fr.;* Nelkenpfeffer, *Germ.;* Pimenti, *Ital.;* Pimienta de la Jamaica, *Span.*

Myrtus. *Sex. Syst.* Icosandria Monogynia.—*Nat. Ord.* Myrtaceæ.

Gen. Ch. Calyx five-cleft, superior. *Petals* five. *Berry* two to five-celled, many-seeded. *Willd.*

By professor Lindley, of London, the pimento tree has been withdrawn from the *Myrtus*, and erected into a new genus, by the title of *Pimenta*, of which the following character is given. "*Calyx* five-cleft; *petals* five; *ovary* two-celled; *ovules* solitary apense; *style* straight; *stigma* somewhat capitate." (*Loudon's Encyc. of Plants.*) This genus contains but a single species, which is named *Pimenta vulgaris.* We adhere, however, to the officinal title.

Myrtus Pimenta. Willd. *Sp. Plant.* ii. 973; Woodv. *Med. Bot.* p. 541. t. 194. This species of myrtle is a beautiful tree, about thirty feet high, with a straight trunk, much branched above, and covered with a very smooth gray bark. Its dense and ever-verdant foliage gives it at all times a refreshing appearance. The leaves, which are petiolate, vary in shape and size; but are usually about four inches long, elliptical, entire, blunt or obtusely pointed, veined, and of a deep shining green colour. The flowers are small, without show, and disposed in panicles upon trichotomous stalks, which usually terminate the branches. The fruit is a spherical berry, crowned with the persistent calyx, and when ripe is smooth, shining, and of a black or dark purple colour. The tree exhales an aromatic fragrance, especially during the summer months, when it is in flower.

It is a native of the West Indies, Mexico, and South America, and is particularly abundant in Jamaica, whence its fruit received the name of *Jamaica pepper.* The berries are the officinal portion of the plant. They are gathered after having attained their full size, but while yet green, and are carefully dried in the sun. When sufficiently dry, they are put into bags and casks for exportation.

Properties. The berries, as they reach us, are of different sizes, small, round, wrinkled, umbilicate at the summit, of a brownish colour, and when broken present two cells, each containing a black hemispherical seed. They have a fragrant odour, thought to resemble that of a mixture of cinnamon, cloves, and nutmeg: hence the name of *allspice*, by which they are best known in this country. Their taste is warm, aromatic, pungent, and slightly astringent. They impart their flavour to water, and all their virtues to alcohol. The infusion is of a brown colour, reddens litmus paper, and affords a black precipitate with the salts of iron. They yield a volatile oil by distillation. (See *Oleum Pimentæ.*) Neumann ascertained that their aromatic flavour depends on the volatile oil, their pungency in great measure upon a substance soluble in alcohol and insoluble in water. By a minute analysis, M. Bonastre obtained from them a volatile oil, a green fixed oil, a concrete oleaginous substance in yellowish flakes, tannin, gum, resin, uncrystallizable sugar, colouring matter, malic and gallic acids, saline matters, moisture, and lignin. The green oil has the burning aromatic taste of pimento, and is supposed to be the acrid principle. Upon this, therefore, together with the volatile oil, the medical properties of the berries depend; and as these two principles exist most largely in the shell or cortical portion, this part is most efficient. According to M. Bonastre, the shell contains 10 per cent. of the volatile, and 8 of the fixed oil, the seeds only 5 per cent. of the former, and 2.5 of the latter. Berzelius considers the green fixed oil of Bonastre as a mixture of volatile oil, resin, fixed oil, and perhaps a little chlorophylle.

Medical Properties and Uses. Pimento is a warm, aromatic stimulant, used in medicine chiefly as an adjuvant to tonics and purgatives, the taste of which it serves to cover, while it increases their warmth and renders them more acceptable to the stomach. It is particularly useful in cases attended with much flatulence. It is, however, much more largely employed as a condiment than as a medicine. The dose is from ten to forty grains.

Off. Prep. Aqua Pimentæ, *Lond.*, *Ed.*, *Dub.;* Oleum Pimentæ, *U. S.*, *Lond.*, *Ed.*, *Dub.;* Pilulæ Opiatæ, *Ed.;* Spiritus Pimentæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Syrupus Rhamni, *Lond.*, *Dub.* W.

PIPER. *U. S.*

Black Pepper.

"Piper nigrum. Baccæ, *The berries.*" *U.S.*

Off. Syn. PIPERIS NIGRI BACCÆ. Piper nigrum. Baccæ. *Lond.;* PIPERIS NIGRI FRUCTUS. *Ed.;* PIPER NIGRUM. Semina. *Dub.*

Poivre, *Fr.;* Schwarzer Pfeffer, *Germ.;* Gemeine peper, *Dutch.;* Pepe nero, *Ital.;* Pimienta negra, *Span.;* Fifil uswud, *Arab.;* Lada, *Malay;* Maricha, *Javan.;* Sahan. *Palembang.*

Piper. See CUBEBA.

Piper nigrum. Willd. *Sp. Plant.* i. 159; Woodv. *Med. Bot.* p. 721. t. 246. The pepper vine is a perennial plant, with a round, smooth, woody, articulated stem, swelling near the joints, branched, and from eight to twelve feet or more in length. The leaves are entire, broad ovate, acuminate, seven-nerved, coriaceous, very smooth, of a dark green colour, and attached by strong, sheath-like footstalks to the joints of the branches. The flowers are small, whitish, sessile, covering thickly a cylindrical spadix, and succeeded by globular berries, which are of a red colour when ripe.

The vine grows wild in Cochin-china and various parts of India. It is cultivated on the coast of Malabar, in the peninsula of Malacca, in Siam, Sumatra, Java, Borneo, the Philippines, and many other places in the East. We are told by Crawford, that the best pepper is raised in Malabar; but Europe and America derive their chief supplies from Sumatra and Java. The vine is propagated by cuttings, and is supported by props, or by trees of various kinds planted for the purpose, upon which it is trained. In three or four years from the period of planting, it begins to bear fruit. The berries are gathered before they are all perfectly ripe, and upon being dried, become black and wrinkled.

White pepper is the ripe berry deprived of its skin by maceration in water and subsequent friction, and afterwards dried in the sun. It has less of the peculiar virtues of the spice than the black pepper, and is seldom employed in this country.

Properties. The dried berries are about as large as a small pea, externally blackish and wrinkled, internally whitish, of an aromatic smell, and a hot, pungent, almost fiery taste. They yield their virtues partially to water, entirely to alcohol and ether. Pelletier found them to contain a peculiar crystalline matter called *piperin*, an acrid concrete oil of a green colour, a balsamic volatile oil, a coloured gummy substance, an extractive matter like that found in leguminous plants capable of being precipitated by infusion of galls, a portion of bassorin, uric and malic acids, lignin, and various salts. Of these principles the piperin and the acrid concrete oil are those which have attracted most attention. *Piperin* was discovered by professor Œrsted of Copenhagen, who considered it a vegetable alkali, and the active principle of pepper. Pelletier, however, utterly denies its alkaline nature and medical activity, and ascribes all the effects supposed to have been obtained from it to a portion of the acrid concrete oil with which it is mixed when not very carefully prepared. He considers it a resin analogous to that which Vauquelin found in cubebs. When perfectly pure, *piperin* is in colourless transparent crystals, without taste, fusible at 212°, insoluble in cold water, slightly soluble in boiling water which precipitates it upon cooling, soluble in alcohol, ether, and acetic acid, decomposed by the concentrated mineral acids, with the sulphuric becoming of a blood-red colour, with the nitric, first of a greenish-yellow, then orange, and ultimately red. It is obtained by treating pepper with alcohol, evaporating the tincture to the consistence of an extract, submitting the residue to the action of an alkaline solution by which the oleaginous matter is converted into soap, washing the undissolved portion with cold water, separating the liquid by filtration, treating the matter left on the filter with alcohol, and allowing the solution thus obtained to evaporate spontaneously, or by a gentle heat. Crystals of piperin are deposited, and may be purified by alternate solution in alcohol or ether, and crystallization. The taste of pepper depends on the peculiar concrete oil before alluded to, and probably also on the volatile oil. The former is of a deep green colour, the latter is limpid, colourless, becoming yellow by age, of a strong odour, and of a taste less acrid than the pepper. The medicinal activity of pepper probably depends on these two ingredients.

Medical Properties and Uses. Black pepper is a warm carminative stimulant, capable of producing general arterial excitement, but acting with greater proportional energy on the part to which it is applied. From the time of Hippocrates it has been employed as a condiment and medicine. Its culinary uses at present are too well known to require notice. Its chief medicinal application is to excite the languid stomach, and correct flatulence. It was long since occasionally administered for the cure of intermittents; but its employment for this purpose had passed from the hands of the profession into those of the vulgar, till recently revived by an Italian physician, to be again consigned to forgetfulness. Piperin has also been employed in the same complaint; and has been recommended as superior even to the sulphate of quinia; but experience has not confirmed the first reports in its favour. That in its impure state, when mixed with a portion of the acrid principle, it will occasionally cure intermittents, there can be no doubt; but it is not comparable to the preparations of bark, and is probably less active than the alcoholic extract of pepper. When perfectly pure it is inert. In those cases of intermittents in which the stomach is not duly susceptible to the action of quinia, as in some instances of drunkards, pepper may be found a useful adjuvant to the more powerful febrifuge.

The dose of pepper is from five to twenty grains. It may be given in the state of the berry or in powder; but is more energetic in the latter. Piperin has been given in doses varying from one to six or eight grains.

Off. Prep. Confectio Piperis Nigri, *Lond.*, *Dub.;* Confectio Rutæ, *Lond.*, *Dub.;* Emplast. Cantharidis Vesicatoriæ Comp., *Ed.;* Unguentum Piperis Nigri, *Dub.* W.

PIPER LONGUM. Semina. *Dub.*

Long Pepper.

Off. Syn. PIPERIS LONGI FRUCTUS. Piper longum. Fructus immaturus exsiccatus. *Lond.;* PIPERIS LONGI FRUCTUS. *Ed.*

Poivre longue, *Fr.;* Langer Pfeffer, *Germ.;* Pepe lungo, *Ital.;* Pimienta larga, *Span.*

PIPER. See PIPER.

Piper longum. Willd. *Sp. Plant.* i. 161; Woodv. *Med. Bot.* p. 724. t. 247. This species of Piper differs from its congeners in having its lower leaves cordate, petiolate, seven-nerved, its upper oblong cordate, sessile, and five-nerved; its flowers in dense, short, terminal, and nearly cylindrical spikes; and its fruit, consisting of very small one-seeded berries or grains, embedded in a pulpy matter. It is a native of South-eastern Asia, and is produced abundantly in Bengal and many parts of Hindostan. The fruit is green when immature, and becomes red as it ripens. It is gathered in the former state, as it is then hotter than when perfectly ripe. The whole spike is taken from the plant and dried in the sun.

Long pepper is cylindrical, an inch or more in length, indented on its surface, of a dark gray colour, a weak aromatic odour, and a pungent fiery taste. M. Dulong found its chemical composition to be closely analogous to that of black pepper as ascertained by Pelletier. Like that it contains *piperin*, a concrete oil upon which its burning acrimony depends, and a volatile oil to which it probably owes its odour. Its medical virtues are essentially the same with those of the black pepper; but it is considered inferior to that spice, and is seldom used.

Off. Prep. Confectio Opii, *Lond.*, *Dub.;* Pulvis Aromaticus, *Dub.;* Pulvis Cretæ Compositus, *Lond.*, *Dub.;* Tinct. Cinnamom. Comp., *Lond.*, *Ed.* W.

PIX ABIETIS. *U.S.*

Burgundy Pitch.

"Pinus abies. Succus concretus præparatus. *The prepared concrete juice.*" *U.S.*

Off. Syn. PIX ABIETINA. Pinus Abies. Resina præparata. *Lond.;* PINI RESINA SOLIDA sponte concreta, vulgo, PIX BURGUNDICA. *Ed.;* PIX BURGUNDICA. PINUS ABIES. Resina. Thus. *Dub.*

Poix de Bourgogne, Poix jaune, Poix blanche, *Fr.;* Burgundisches Pech, *Germ.*

PINUS. See TEREBINTHINA.

Pinus Abies. Willd. *Sp. Plant.* iv. 506; Woodv. *Med. Bot.* p. 4. t. 2.—*Abies communis.* Lindley *in Loudon's Encyc. of Plants.*—*Abies excelsa.*

De Candolle. The Norway spruce is a very lofty tree, rising sometimes one hundred and fifty feet in height, with a trunk from three to five feet in diameter. The leaves, which stand thickly upon the branches, are short, obscurely four-cornered, often curved, of a dusky green colour, and shining on the upper surface. The male aments are purple and axillary, the female of the same colour, but usually terminal. The fruit is in pendent, purple, nearly cylindrical strobiles, the scales of which are oval, pointed, and ragged at the edges.

This tree is a native of Europe and Northern Asia. Though designated as the source of Burgundy pitch, it furnishes but a part of the substance sold under that name by the druggists. Tingley asserts that the real Burgundy pitch is obtained from the *Pinus picea*, or European silver fir tree; and the same fact is stated by Fée. According to Geiger, who is probably correct, it is procured from both species. To obtain the *pitch*, portions of the bark are removed so as to lay bare the wood, and the flakes of concrete resinous matter which form upon the surface of the wound, having been detached by iron instruments, are melted with water in large boilers, and then strained through coarse cloths. It is called Burgundy pitch from the province of that name in the East of France. We are told that the greater portion is collected in the neighbourhood of Neufchatel.

From other species of pine in different parts of Europe, a similar product is obtained and sold by the same name. It is prepared by removing the juice which concretes upon the bark of the tree or upon the surface of incisions, called *galipot* by the French, and purifying it by melting and straining, either through cloth or a layer of straw.

A fictitious Burgundy pitch is also made by melting together common pitch, resin, and turpentine, and agitating the mixture with water, which gives it the requisite yellowish colour. Its odour is different from that of the genuine.

As brought to this country, Burgundy pitch is generally mixed with impurities, which require that it should be melted and strained before being used. In its pure state it is hard, brittle, quite opaque, of a yellowish or brownish-yellow colour, and a weak terebinthinate taste and odour. It is very fusible, and at the heat of the body softens and becomes adhesive. It differs from turpentine in containing a smaller proportion of essential oil.

Under the name of ABIETIS RESINA, the London College directs the concrete juice of the *spruce fir*, as taken immediately from the bark of the tree, without any preparation. It is the *Thus* or *Frankincense* of the former London and present Dublin Pharmacopœia. "It is in the form of solid brittle tears, of a brownish-yellow colour on the outside, and internally white, and emits a very agreeable odour upon burning." (*Thomson's Dispensatory.*) Though ascribed to the *Pinus Abies*, it is probably obtained also from other species; and we have been told by an apothecary from London, that an article exactly resembling our common white turpentine when perfectly dried, is sold as frankincense in the shops of that city.

Medical Properties and Uses. Applied to the skin in the shape of a plaster, Burgundy pitch acts as a gentle rubefacient, producing a slight degree of inflammation and serous effusion without separating the cuticle. Sometimes it excites a papillary or vesicular eruption; and we have known it to act upon the surface as a violent poison, giving rise to excessive pain, tumefaction, and redness, followed by vesication and even ulceration. It is used chiefly in cases of slight chronic pains of a rheumatic character, or in chronic affections of the chest or abdominal viscera, which call for a gentle but long continued revulsive action upon the skin.

The *Abietis Resina*, or *Frankincense*, is used only as an ingredient of plasters.

Off. Prep. Emplast. Cantharidis Vesicatoriæ Comp., *Ed.;* Emplast. Cumini, *Lond.;* Emplast. Galbani Comp., *U.S.;* Emplast. Opii, *Dub.;* Emplast. Picis cum Cantharide, *U.S.*, *Dub.*

Off. Prep. of the Resin of the Spruce Fir. Emplast. Aromatic., *Dub.;* Emplast. Galbani Comp., *Lond.;* Emplast. Opii, *Lond.*, *Ed.;* Emplast. Picis Comp., *Lond.* W.

PIX CANADENSIS. *U.S.*

Hemlock Pitch.

"Pinus Canadensis. Succus concretus præparatus. *The prepared concrete juice.*" *U. S.*

Pinus. See TEREBINTHINA.

Pinus Canadensis. Willd. *Sp. Plant.* iv. 505.—*Abies Canadensis.* Michaux, *N. Am. Sylv.* iii. 185. This is the *hemlock spruce* of the United States and Canada. When of full growth it is often seventy or eighty feet high, with a trunk two or three feet in diameter, and of nearly uniform dimensions for two-thirds of its length. The branches are slender, and dependent at their extremities. The leaves are very numerous, six or eight lines long, flat, denticulate, and irregularly arranged in two rows. The strobiles are ovate, little longer than the leaves, pendulous, and situated at the ends of the branches.

The tree is abundant in Canada, Nova Scotia, and the more northern parts of New England; and is found in the elevated and mountainous regions of the Middle States. Its bark abounds in the astringent principle, and is much used for tanning in the northern parts of the United States. It contains much less juice than some other species of pine; and very little flows from incisions made into its trunk. But in the trees which have attained their full growth, and are about or have begun to decay, the juice exudes spontaneously, and hardens upon the bark in consequence of the partial evaporation or oxidation of its essential oil. The bark thus incrusted is stripped from the tree, broken into pieces of convenient size, and boiled in water. The pitch melts, rises to the surface, is skimmed off, and is still further purified by a second boiling in water. It is brought to Philadelphia from the North of Pennsylvania, in dark coloured brittle masses, which on being broken exhibit numerous minute fragments of bark, interspersed through their substance. From these it is purified in the shops by melting and straining through linen or canvass.*

Thus prepared it is hard, brittle, quite opaque, of a dark yellowish-brown colour which becomes still darker by exposure to the air, of a weak peculiar odour, and scarcely any taste. It softens and becomes adhesive with a moderate heat, and melts at 198° F. Its constituents are resin and a minute proportion of essential oil. It is most generally known by the incorrect name of *hemlock gum*.

Medical Properties and Uses. Hemlock pitch is a gentle rubefacient, closely analogous to Burgundy pitch in its properties, and employed for precisely the same purposes. W.

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* See a paper by Mr. Charles Ellis in the Journ. of the Phil. Col. of Pharm., vol. ii. p. 18.

PIX LIQUIDA. *U.S.*

Tar.

"Pinus palustris et aliæ. Terebinthina empyreumatica. *The impure turpentine procured by burning.*" *U. S.*

Off. Syn. PIX LIQUIDA. Pinus sylvestris. Resina præparata liquida. *Lond.;* PINI RESINA EMPYREUMATICA, vulgo, PIX LIQUIDA. *Ed.;* PIX LIQUIDA. E speciebus Pini diversis. *Dub.*

Gondron, *Fr.;* Theer, *Germ.;* Pece liquida, *Ital.;* Alquitran, *Span.*

The tar used in this country is prepared from the wood of various species of pine, particularly the *Pinus palustris* of the Southern States, the *P. australis* of Michaux. (See *Terebinthina.*) The dead wood is usually selected, because, when vegetation ceases, the resinous matter becomes concentrated in the interior layers. The wood is cut into billets of a convenient size, which are placed together so as to form a large stack or pile, and are then covered with earth as in the process for making charcoal. The stack is built upon a small circular mound of earth previously prepared, the summit of which gradually declines from the circumference to the centre, where a small cavity is formed, communicating by a conduit with a shallow ditch surrounding the mound. Fire is applied through an opening in the top of the pile, and a slow combustion is maintained, so that the resinous matter may be melted by the heat. This runs into the cavity in the centre of the mound, and passes thence by the conduit into the ditch, whence it is emptied into barrels. Immense quantities of tar are thus prepared in North Carolina and the south-eastern parts of Virginia, sufficient, after supplying our own consumption, to afford a large surplus for exportation.

Considerable quantities of tar are also prepared in the lower parts of New Jersey, in some portions of New England, and in Pennsylvania west of the Alleghany mountains, from the *Pinis rigida*, or pitch pine, and perhaps from some other species.

Properties. Tar has a peculiar empyreumatic odour, a bitterish resinous somewhat acid taste, a colour almost black, and a tenacious consistence intermediate between that of a liquid and solid. It consists chiefly of resin, united with acetic acid and empyreumatic oil, and coloured with charcoal. The empyreumatic oil obtained by distillation from tar has been ascertained by Dr. Reichenbach, of Moravia, to contain six distinct principles, which he has named *paraffine*, *eupione*, *creosote*, *picamar*, *capnomor*, and *pittacal.* Of these only picamar and creosote merit particular attention; the former as the principle to which tar owes its bitterness, the latter as the one upon which it probably depends chiefly for its medical virtues. (See *Creosote* in the Appendix.) Tar yields a small proportion of its constituents to water, which is thus rendered medicinal, and is employed under the name of *tar water.* By long boiling the liquid parts are evaporated, and the tar is converted into *pitch*, the Pix Nigra of the London College.

Medical Properties and Uses. The medical properties of tar are similar to those of the turpentines. It is sometimes used in chronic coughs, and when the disease depends on chronic bronchial inflammation, with occasional advantage. Little benefit can be expected from it in genuine phthisis, in the treatment of which it was formerly highly recommended. Dr. Bateman employed it advantageously as an internal remedy in ichthyosis. Its vapour, inhaled into the lungs, has been found serviceable in numerous cases of bronchial disease. Externally applied, in the state of ointment, it is a very efficient remedy in some cases of tinea capitis, or scald head; and has been used with advantage in foul or indolent ulcers, and some other affections of the skin.

It may be used in the form of tar water, *Aqua Picis Liquidæ*, or in substance made into pills with wheat flour, or mixed with sugar in the form of an electuary. The dose is from half a drachm to a drachm, and may be repeated so as to amount to three or four drachms daily.

Off. Prep. Aqua Picis Liquidæ, *Dub.;* Unguentum Picis Liquidæ. *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

PIX NIGRA. *Lond.*

Black Pitch.

"Pinus Sylvestris. *Resina præparata solida.*" *Lond.*

This is the solid black mass left after the evaporation of the liquid parts of tar. (See *Pix Liquida.*) It is employed only as an external remedy.

Off. Prep. Unguentum Picis Nigræ, *Lond.* W.

PLUMBUM.

Lead.

Plomb, *Fr.;* Blei, *Germ.;* Lood, *Dutch;* Piombo, *Ital.;* Plomo, *Span.;* Chumbo, *Port.*

Lead is not officinal in its metallic state; but enters into a number of important medicinal preparations. It occurs in nature in three principal states—as an oxide; as a sulphuret called *galena;* and as a salt, forming the native sulphate, phosphate, carbonate, chromate, molybdate, and arseniate of lead. The oxide is rare, but galena is exceedingly abundant and diffused, and is the ore from which all the lead of commerce is extracted. The process of extraction consists merely in melting the ore in contact with charcoal. Mines of galena occur in different parts of the world, but the richest and most extensive are found in our own country. The lead region of the United States extends in length from the Wisconsin in the north, to the Red river of Arkansas in the south, and in breadth about one hundred and fifty miles. It is only of latter years that these mines have been extensively worked; and they were estimated, in 1834, to yield ten millions of pounds.

Properties. Lead is a soft, bluish-white, and very malleable metal, presenting a bright surface when newly melted or cut. It has a perceptible taste, and a peculiar smell when rubbed. It undergoes but little change in the air, but is corroded by the combined action of air and water. Its sp. gr. is 11.4, melting point about 600°, and equivalent number 103.6. Exposed to a stream of oxygen on ignited charcoal, it burns with a blue flame, throwing off dense yellow fumes. The best solvent of lead is nitric acid; but the presence of sulphuric acid destroys, and that of muriatic acid lessens its solvent power, on account of the compounds which these acids form with lead being nearly insoluble. Lead forms four oxides, a dinoxide, protoxide, peroxide, and red oxide. The *dinoxide* consists of two equivalents of lead, and one of oxygen. The *protoxide*, called in commerce *massicot*, may be obtained by calcining, in a platinum crucible, the subnitrate of lead, formed by precipitating a solution of the nitrate with ammonia. On a large scale it is manufactured by exposing melted lead to the action of the air. Its surface becomes incrusted with a gray pellicle, which being scraped off, is quickly succeeded by another; and the whole of the metal, being in this way successively presented to the air, becomes converted into a greenish-gray powder, consisting of protoxide and metallic lead. This, by a moderate exposure to heat, absorbs more oxygen, and is converted entirely into protoxide. This oxide has a yellow colour, and is the one present in the salts of lead. It consists of one equiv. of lead 103.6, and one of oxygen 8=111.6. A variety of this oxide, called *litharge*, is very much used in pharmacy, and is officinal in all the Pharmacopœias. (See *Plumbi Oxidum Semivitreum.*) The *peroxide*, called also *puce* oxide, from its *flea*-brown colour, may be obtained by treating red lead with nitric acid. The acid takes up the protoxide, and leaves the peroxide, which may be purified by washing with boiling water. It is a tasteless powder, of a dark-brown colour. When heated to redness it loses half its oxygen, and becomes protoxide. It consists of one equiv. of lead 103.6, and two equiv. of oxygen 16=119.6. The *red oxide*, called in commerce *minium*, or *red lead*, is officinal with the Edinburgh College, and is described under another head. (See *Oxidum Plumbi Rubrum.*) Lead combines also with chlorine, forming a sparingly soluble chloride. This combination is precipitated whenever a muriate is added to a soluble salt of lead. The salts of lead are numerous and important. The nitrate is in the form of white crystals, and the sulphate in that of an insoluble white powder.

The best tests of this metal are sulphuretted hydrogen, and a solution of hydriodate of potassa. The former produces a dark-brown precipitate of sulphuret of lead, and the latter a yellow one of iodide of lead.

Medical Properties and Uses. The effects of lead in its various combinations are those of a sedative and astringent. It is used internally for the purpose of reducing vascular action, and of restraining inordinate discharges; and externally as an abater of inflammation. When introduced into the system by imperceptible degrees, it acts injuriously on the nervous system, producing a peculiar colic, called *lead colic*, and palsy, which is almost always partial and incomplete. It has been proved by Dr. A. T. Thomson, of London, that of all the ordinary preparations of lead, the carbonate is the most virulent; and that those salts which are easily convertible into the carbonate are also highly poisonous. On the other hand, those combinations which are not susceptible of this change, such as the nitrate, muriate, &c. may be given in large doses to inferior animals, without perceptible inconvenience. If these views should prove correct, it would follow that the best antidote to the poisonous effects of lead, would be the free use of vinegar, to convert the carbonate into the soluble acetate.

According to M. Gendrin, sulphuric acid, prepared like lemonade, and used both internally and externally, is a remedy and prophylactic for the poisonous effects of lead, especially the lead colic. Its utility appears to have been fully tested in a large white lead manufactory in France. *Amer. Journ. of Med. Sci.* xv. 528.

Pharm. Preparations. The following table embraces a list of all the officinal preparations containing lead in the United States and British Pharmacopœias.

Oxidum Plumbi Rubrum, *Ed.*

Plumbi Oxidum Semivitreum, *U.S.;* Plumbi Oxydum Semivitreum, *Lond.*, *Dub.;* Oxidum Plumbi Simivitreum, *Ed.* Anglicé, *Litharge.*

Ceratum Saponis, *U.S.*, *Lond.*

Emplastrum Plumbi, *U. S.*, *Lond.;* Emplastrum Oxidi Plumbi Semivitrei, *Ed.;* Emplastrum Lithargyri, *Dub.* Anglicè, *Lead plaster, Litharge plaster.**
Liquor Plumbi Subacetatis, *U.S.*, *Lond.;* Plumbi Subacetatis Liquor, *Dub.*
Liquor Plumbi Subacetatis Dilutus, *U.S.*, *Lond.;* Plumbi Subacetatis Liquor Compositus, *Dub.* Anglicè, *Lead-water.*
Ceratum Plumbi Subacetatis, *U.S.;* Ceratum Plumbi Compositum, *Lond.* Anglicè, *Goulard's cerate.*
Plumbi Acetas, *U.S.*, *Lond.*, *Dub.;* Acetas Plumbi, *Ed.*
Ceratum Plumbi Acetatis, *Lond.;* Unguentum Acetatis Plumbi, *Ed.;* Unguentum Plumbi Acetatis, *Dub.*
Plumbi Carbonas, *U.S.*, *Dub.;* Plumbi Subcarbonas, *Lond.;* Carbonas Plumbi, *Ed.*
Unguentum Plumbi Carbonatis, *U.S.*, *Dub.;* Unguentum Carbonatis Plumbi, *Ed.*
Emplastrum Plumbi Carbonatis, *U.S.*
Ceratum Plumbi Carbonatis, *U.S.* B.

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PLUMBI ACETAS. *U.S.*, *Lond.*, *Dub.*

Acetate of Lead.

Off. Syn. ACETAS PLUMBI. *Ed.*

Sugar of lead; Saccharum Saturni, Cerussa acetata, *Lat.;* Acétate de plomb, Sucre de plomb, Sel de Saturne, *Fr.;* Essigsaures Bleioxyd, Bleizucker, *Germ.;* Zucchero di Saturno, *Ital.;* Azucar de plomo, *Span.*

Directions are given by the three British Colleges for preparing acetate of lead; but as it is seldom or never prepared by the apothecary, and may be obtained in the greatest perfection, and at a cheap rate, from the manufacturing chemist, it is more properly placed in the United States Pharmacopœia in the catalogue of the Materia Medica.

Preparation. Sugar of lead is obtained by two methods. By one method, thin plates of lead are placed in shallow vessels filled with distilled vinegar, in such a manner as to have a part of each plate rising above the vinegar; and they are turned from time to time, so as to bring different portions of the metallic surface in contact with the air. The metal becomes protoxidized, and dissolves in the vinegar to saturation, and the solution is evaporated to the point of crystallization. This process is a slow one, but furnishes a salt which is perfectly neutral. The other method consists in dissolving, by the assistance of heat, litharge, or the protoxide of lead obtained by calcination, in an excess of distilled vinegar or purified pyroligneous acid, contained in leaden boilers. The oxide is quickly dissolved, and when the vinegar has become saturated, the solution is transferred to other vessels to cool and crystallize. The crystals having formed, the mother waters are decanted, and, by a new evaporation, made to yield a new crop. These are generally of a yellow colour, but may be purified by repeated solutions and crystallizations.

The processes of the British Colleges for preparing this salt, agree in directing the solution of carbonate of lead (white lead) in dilute acetic acid, or distilled vinegar, but we do not deem it expedient to copy them, as they are ineligible and expensive.

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* This plaster forms the basis of a number of other plasters.

Sugar of lead is extensively manufactured in Germany, Holland, France, and England; its principal consumption being caused by the arts of dyeing and calico-printing, in which it is employed to form with alum the acetate of alumina, which is used as a mordant. By far the larger part consumed in the United States is obtained from foreign countries, principally from England and France; a comparatively small portion only being made in our own laboratories. The importation for the year ending in September 1832, exceeded three hundred and fifty thousand pounds.

Properties. Acetate of lead is a white salt, crystallized in brilliant needles, which have the shape of long prisms, terminated by dihedral summits. Its taste is at first sweet and afterwards astringent. Exposed to the air, it effloresces slowly. It dissolves in four times its weight of cold, and in a much smaller quantity of boiling water. It is soluble also in alcohol. Carbonic acid water, as well as common water, which uniformly contains this acid, produces a slight precipitate of carbonate of lead in the commercial acetate, an occurrence which seems to depend upon the presence of a slight excess of base in the latter, and which may be prevented by the addition of a small portion of vinegar, or of dilute acetic acid. In pure distilled water, free from carbonic acid, it ought to dissolve entirely, and form a clear solution. Sulphuric acid or a soluble sulphate, when added to a solution of the acetate of lead, produces instantly a precipitate of sulphate of lead; but the most important property of sugar of lead is its power of dissolving a large quantity of protoxide of lead. (See *Liquor Plumbi Subacetatis.*) It consists of one equiv. of acetic acid 51.48, one of protoxide of lead, 111.6, and three of water 27 = 190.08.

Incompatibles. Acetate of lead is decomposed by all acids, and by those soluble salts formed from them, which produce with protoxide of lead insoluble or sparingly soluble compounds. Acids of this character are the sulphuric, muriatic, citric, and tartaric. It is also decomposed by lime-water, and by ammonia, potassa, and soda; the two last, if added in excess, dissolving the precipitate at first formed. It is decomposed by hard water, in consequence of the sulphate of lime and common salt, which such water usually contains. With sulphuretted hydrogen, it gives a black precipitate of sulphuret; and with the solution of acetate of ammonia, a white one of carbonate, in consequence of the carbonic acid diffused through this acetate as ordinarily prepared.

Medical Properties and Uses. Acetate of lead, in medicinal doses, is a powerful astringent and sedative, and in large ones, an irritant poison, producing inflammation of the alimentary canal, if the patient survive for some time; but if the quantity taken be large, the stomach is apt to present a peculiar blanched appearance. The danger, however, from over-doses of sugar of lead is not so great as is generally supposed. It has sometimes been given in pretty large doses in regular practice, without any bad effects, and cases are on record where a quarter of an ounce has been swallowed without proving fatal. According to Dr. A. T. Thomson, the poisonous quality of this salt is to be attributed to its tendency to become converted into carbonate in the stomach; and hence he finds that if it be mixed with vinegar, it may be freely and safely administered in medical practice. The principal diseases in which it has been exhibited, are hemorrhages, particularly from the lungs, intestines, and uterus. Its effect in restraining the discharge of blood is admitted to be very powerful. It has also been used with advantage in certain forms of dysentery and diarrhœa, and has been recommended in particular stages of cholera infantum. But the practitioner should always bear in mind, that this medicine, when long continued in small doses, is liable to produce dangerous constitutional effects. These effects are of two kinds; 1. an affection of the alimentary canal, attended with violent pain and obstinate constipation, called *colica pictonum*, or *lead colic;* 2. a chronic affection of the muscles, especially of the extensors of the upper extremities, characterized by an excessive wasting of these organs, and denominated *lead palsy*. Both these affections are very apt to be excited in those artisans who work in lead. Acetate of lead, when combined with opium, is less apt to produce these deleterious effects, and, according to Dr. Thomson, when taken with vinegar, is rendered entirely safe, as above mentioned. Its bad effects are also prevented by the use of dilute sulphuric acid. (See *Plumbum.*) Its solution is frequently used as a collyrium; and applied by means of cloths, or mixed with crumb of bread, it forms a good application to superficial inflammation. For the latter purpose, the subacetate of lead is better. (See *Liquor Plumbi Subacetatis Dilutus.*) The dose of sugar of lead is from one to two grains, in the form of pill, repeated every two or three hours. The solution for external use may be made by dissolving from two drachms to half an ounce of the salt in a pint of water; and if it be wanted clear, a fluidrachm of vinegar or dilute acetic acid may be added, which immediately dissolves the carbonate of lead, to which its turbidness is owing. The usual strength of the solution as a collyrium is from one to two grains to the fluidounce of water.

Off. Prep. Ceratum Plumbi Acetatis, *Lond.*, *Ed.*, *Dub.;* Liquor Plumbi Subacetatis, *U.S.* B.

PLUMBI CARBONAS. *U.S.*

Carbonate of Lead.

Off. Syn. PLUMBI SUBCARBONAS. *Lond.;* CARBONAS PLUMBI. *Ed.;* PLUMBI CARBONAS. CERUSSA. *Dub.*

White lead; Céruse, Carbonate de plomb, Blanc de plomb, Blanc de céruse, *Fr.;* Bleiweiss, *Germ.;* Cerussa, *Lat.*, *Ital.;* Albayalde, *Span.*

Preparation. Carbonate of lead is prepared by two principal methods. By one method it is obtained by passing a stream of carbonic acid, proceeding from a fire of charcoal, through a solution of subacetate of lead. The carbonic acid combines with the excess of protoxide and precipitates as carbonate of lead, while a neutral acetate remains in solution. This, by being boiled with a fresh portion of protoxide, is again brought to the state of subacetate, when it is treated with carbonic acid as before. In this way the same portion of acetate repeatedly serves the purpose of being converted into subacetate, and of being decomposed by carbonic acid. The carbonate obtained is washed, dried by a gentle heat, and thrown into commerce. This process, which produces white lead of the first quality, was invented and made public by Thenard, about the year 1802, and is that which is pursued in France and Sweden. The other method, which consists in exposing lead to the vapours of vinegar, originated in Holland, and is pursued in England and the United States; but in England, with some modifications, which are kept secret. We shall describe the process as pursued by our own manufacturers. The lead is cast into thin sheets, made by pouring the melted metal over a long sheet-iron shovel, with a flat bottom, and raised edges on its sides, which is held in a slanting direction over the melting pot. As many of these sheets are then loosely rolled up as may be sufficient to form a cylinder, five or six inches in diameter, and seven or eight high, which is placed in an earthen pot containing about half a pint of vinegar, and having within a few inches from the bottom, three equidistant projecting portions in the earthenware, on which the cylinder of lead is designed to rest, in order to keep it from contact with the vinegar. The pots thus prepared are placed side by side, in horizontal layers, in a building roughly constructed of boards, with interstices between them. The first layer is covered with boards, on which a stratum of refuse straw from the stables is strewed; and fresh layers of pots, boards, and straw, are successively placed, until the whole building is filled. The sides also are enclosed with straw. The *pile* of pots, called a bed, is allowed to remain undisturbed for about six weeks, at the end of which time, it is taken down, and the cylinder of lead in each pot, though still retaining its shape, is found almost entirely converted into a flaky, white, friable substance, which is the white lead. This is separated from the lead yet remaining in the metallic state, ground in water, whereby it is washed and reduced to fine powder, and finally dried in long, shallow reservoirs, usually heated by steam.

The theory of the above process is not well understood. It is generally supposed that the vinegar by its decomposition furnishes the oxygen and part of the carbonic acid to the lead, the remainder of this acid being supplied by the decomposition of the straw, which is found to undergo a kind of fermentation. This fermentation maintains the requisite degree of heat, which should be about 113°. If the temperature falls below 95°, part of the lead escapes corrosion, and if it rises above 122°, the product is yellow. According to Berzelius, the white lead made by this process is of better quality, the more perfectly the air is excluded, a fact, which, if well founded, proves that the metal is not oxidized at the expense of the oxygen of the air. It is never perfectly white; for the fermentation of the straw generating a little sulphuretted hydrogen prevents it from being so. It would be an improvement in the process, if the requisite temperature could be maintained without the use of straw; and it is probable that a mode of effecting this object is one peculiarity of the English process. The form of the acetic acid usually employed is common vinegar, as has been already stated; but the variable nature of this liquid as to strength and purity is an objection to its use; and, accordingly, other forms of this acid have been substituted for it with advantage, such as the purified acetic acid from wood, sufficiently diluted, and potato vinegar.

The consumption of white lead is principally supplied from our own manufactories. Its importation fell off particularly in 1829, as a consequence of the tariff of 1828. In the latter year about three millions of pounds of white and red lead were received from abroad; in 1832, the amount was but little more than half a million.

Properties. Carbonate of lead is a heavy, opaque, insoluble substance, in powder or friable lumps, of a fine white colour, inodorous, and nearly insipid. Its beauty as a pigment depends in great measure on the purity of the lead from which it is manufactured. It is sometimes adulterated with chalk, or sulphate of baryta in fine powder. Chalk may be detected by dissolving the suspected white lead in vinegar, and adding oxalate of ammonia, which will cause a white precipitate; and if sulphate of baryta be present, it will remain undissolved on the addition of nitric acid. Carbonate of lead is an anhydrous salt, and consists of one equivalent of carbonic acid 22.12, and one of protoxide of lead 111.6 = 133.72. It hence appears that the London College is in error, in calling it a *sub*-carbonate.

Medical Properties and Uses. White lead is ranked in the materia medica as an astringent and sedative. It is employed externally only, being used as an application to ulcers, and to inflamed and excoriated surfaces. It has been recommended as an external application in facial neuralgia. (*Journ. de Pharm.* xx. 603.) It is used either by sprinkling the powder on the part, or in the form of cerate or ointment. (See *Ceratum* and *Unguentum Plumbi Carbonatis.*) Its external use, however, is viewed by many practitioners as extremely dangerous, on account of the risk of absorption; but the danger is certainly overrated, as we have the testimony of respectable physicians that they frequently use it in this way, without the least unpleasant result.

Of the different preparations of lead, the carbonate is considered to be the most virulently poisonous. Being very extensively manufactured for the purposes of the arts, it is that preparation also which most frequently produces the peculiar spasmodic colic, called *colica pictonum.* This disease is characterized by pain about the region of the navel, and obstinate constipation, attended with a frequent desire to evacuate the bowels, and is supposed to depend upon a spasmodic constriction of the intestinal tube, particularly of that portion called the colon. The principal indications in the treatment are, first to allay the spasm, and then to evacuate the bowels by the gentlest means. Opium and mild aperients are accordingly the best remedies, and among the latter castor oil and sulphate of magnesia are to be preferred. Indeed this latter appears peculiarly adapted to the case; for while it acts as an aperient, it operates as a counterpoison, by forming the inert sulphate of lead with any preparation of the metal which it may meet with in the bowels. Calomel is often useful in particular states of the disease, and if it happen to induce ptyalism, the disease immediately yields.

If the views of Dr. A. T. Thomson should be confirmed, of the comparative safety of the soluble salts of lead, they would teach the propriety of allowing the workmen in white lead works, a daily portion of vinegar with their food. Gendrin recommends as a prophylactic against the poisonous effects of lead, the habitual use, internally and externally, of dilute sulphuric acid. (See *Plumbum.*)

Carbonate of lead is used pharmaceutically by the British Colleges for obtaining acetate of lead.

Off. Prep. Emplastrum Plumbi Carbonatis, *U. S.;* Unguentum Plumbi Carbonatis, *U. S., Ed., Dub.* B.

OXIDUM PLUMBI RUBRUM. *Ed.*

Red Oxide of Lead.

Red lead, Minium; Deutoxide de plomb, Minium, *Fr.;* Menning, *Germ.;* Minio, *Ital., Span.*

Preparation. Red lead is prepared on the large scale in a furnace, with the floor slightly concave and the roof arched, presenting a general resemblance to a baker's oven. The lead is placed on the floor, and gradually raised to a red heat, whereby it melts and becomes covered with a pellicle of protoxide, which is removed by means of a long iron scraper; and the pellicles, as they successively form, are scraped off, until the whole of the metal has been converted into them. The product is subjected to further calcination with occasional stirring, for some time, with a view to oxidize any particles of metallic lead. It is thus rendered yellow, and constitutes the *protoxide of lead*, or *massicot*. This is taken out of the furnace and thrown upon a level pavement, and cooled by being sprinkled with water. It is next reduced to fine powder by trituration and levigation, and dried; and in this state is introduced into large, shallow, square tin boxes, which are placed in another furnace, closed from the air, and heated nearly to redness; the heat being allowed gradually to fall during a period of from twenty-four to thirty hours. At the end of this time the protoxide of lead will have combined with an additional quantity of oxygen, and become the red oxide. This is taken out, and having been passed through a fine wire sieve, is packed in barrels for the purposes of commerce.

The above is an outline of the French process for making red lead. In England and the United States, the calcination of the protoxide is not performed in tin boxes, but by replacing it in the furnace in which it was first calcined. To save the first calcination, litharge is generally used for making the red lead of commerce, which consequently contains the impurities of that substance, consisting of iron, copper, a little silver, and silica. The presence of copper is hurtful in red lead, when used for making glass, to which this metal communicates colour. In order to have red lead of good quality, it is necessary that it be made in large quantities at a time. It is also important that it be slowly cooled; for as the absorption of oxygen by which it is formed, takes place during a particular interval of temperature only, it is necessary that the heat within that interval should be maintained sufficiently long to allow all the protoxide to absorb its appropriate dose of oxygen.

Properties, &c. Red lead is in the form of a heavy, scaly powder, of a bright red colour, with a slight shade of orange. Its sp. gr. is about 9. When exposed to heat it gives off oxygen, and is reduced to the state of protoxide. It is sometimes adulterated with red oxide of iron, or red bole, substances which may be detected by dissolving the suspected red lead in nitric acid, and testing with tincture of galls. This reagent will produce a black precipitate, in consequence of the iron present in the substances mentioned. If powdered brick be present, it will be left undissolved upon treating the suspected specimen with muriatic acid. When free from impurities, it is completely reduced on charcoal, by means of the blowpipe, into a globule of metallic lead. When treated by nitric acid, it is resolved into protoxide which dissolves, and peroxide which remains insoluble.

The red lead of commerce may be considered as a mixture of what may be called the true red oxide, and variable proportions of protoxide. That this is its nature is proved by the action of cold dilute acetic acid, not used in excess, which takes up a variable quantity of protoxide, leaving a portion unchanged in colour, which may be deemed the pure red oxide. This latter, when analyzed by nitric acid, has been proved, by the coincident results of Dalton, Dumas, and Phillips, to consist of two equiv. of protoxide, and one of peroxide, corresponding with three equiv. of lead, and four of oxygen. (*Journ. of Phil. Col. of Pharm.* vi. 162, from *Phil. Mag. N. S.* iii. 125.)

Medical Properties and Uses. Red lead is officinal only with the Edinburgh College, and is employed exclusively as an external application, entering into the composition of some unofficinal ointments and plasters. Its chief use is in the arts, as a paint and as an ingredient in flint glass. B.

PLUMBI OXIDUM SEMIVITREUM. *U.S.*

Semivitrified Oxide of Lead.

Off. Syn. PLUMBI OXYDUM SEMIVITREUM. *Lond.;* OXIDUM PLUMBI SEMIVITREUM. *Ed.;* PLUMBI OXYDUM SEMIVITREUM. LITHARGYRUM. *Dub.*

Oxide de plomb fondu, Litharge, *Fr.;* Lithargyrus, *Lat.;* Bleiglätte, *Germ.;* Litargirio, *Ital.;* Almartaga, *Span.*

When the protoxide of lead is rendered crystalline by fusion, it becomes the semivitrified oxide, or litharge. Almost all the litharge of commerce is obtained in the process for extracting silver from argentiferous galenas. After extracting the argentiferous lead from the ore, the alloy is calcined in the open air; whereupon the lead becomes oxidized, and by fusion passes into the state of litharge, while the silver remains behind. The following is an outline of the process.

Preparation. The lead containing the silver is placed upon an oval slightly excavated dish, about three feet long and twenty inches wide, called a *test*, made by beating pulverized bone-earth formed into a paste with water, into a mould, the sides of which are formed of an elliptical band of iron, and the bottom, of strips of sheet iron, placed a little distance apart. The test is of such a size as exactly to fit an opening in the floor of a reverberatory furnace, where it is placed, and adjusted at the level of the floor. On one side of the test the fire-place is situated, and exactly opposite, the chimney; while at one extremity of it the pipe of a strong bellows is placed, and at the other a vertical hole is made, communicating with a gutter leading from the centre of the test. The furnace is now lighted, and shortly afterwards, the bellows is put in motion. The lead fuses and combines with oxygen, and the resulting oxide melting also, forms a stratum which swims on the surface, and which is driven by the wind of the bellows along the gutter, and through the vertical hole, into a recipient below, where, upon solidifying, it crystallizes in small scales, which form the litharge. In proportion as the lead is oxidized and driven off the test, fresh portions are added, so as to keep it always sufficiently full. The process is continued for eight or ten days, after which no more lead is added. The operation is now confined to the metal remaining on the test; and the oxidizement proceeding, a period at last arrives when the whole of the lead has run off as litharge, and the silver, presenting a very brilliant appearance, alone remains. This is then removed, and the process repeated on a fresh portion of argentiferous lead.

Properties. Litharge is in the form of small, brilliant, vitrified scales, some presenting a red, and some a yellow colour. It is devoid of taste or smell. It slowly attracts carbonic acid from the air, and contains more of this acid the longer it has been prepared. It is on this account that it effervesces with the stronger acids. As it occurs in commerce, it usually contains iron, copper, and a little silver and silica. The English litharge is most esteemed; that from Germany being generally contaminated with iron and copper. In choosing litharge, samples should be selected which are free from copper and from fragments of vegetable matter. This metal is detected, if upon adding ferrocyanate of potassa to a nitric solution of the litharge, a brown instead of a white precipitate is produced. Two varieties of litharge are distinguished in commerce, named from their colour, and dependent on differences in the mode of manufacture. Sometimes it has a pale yellow colour and silvery appearance, and is then denominated *litharge of silver*, or *yellow litharge;* at other times it is of a red colour, and is known under the name of *litharge of gold*, or *red litharge*. In composition, litharge is essentially identical with the protoxide of lead. (See *Plumbum*.) The carbonic acid which it contains is variable, dependent on the length of time it has been prepared; but its average amount is about four per cent.

Pharmaceutical Uses, &c. Litharge is never used internally, but is employed in several pharmaceutical operations, and forms an ingredient in various external applications, which are used for abating inflammation, and for other purposes. Combined with olive oil it forms the *Emplastrum Plumbi*, which is the basis of a majority of the preparations technically called *Plasters*. (See *Emplastra*.) In the arts it is extensively employed in the glazing of pottery, in painting to render oils drying, and as an ingredient in flint glass.

Off. Prep. Ceratum Saponis, *U.S.*, *Lond.;* Emplastrum Plumbi, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Liquor Plumbi Subacetatis, *U.S.*, *Lond.*, *Dub.* B.

◆

PODOPHYLLUM. *U.S.*

May-apple.

"Podophyllum peltatum. Radix. *The root.*" *U.S.*

Podophyllum. *Sex. Syst.* Polyandria Monogynia.—*Nat. Ord.* Ranunculi, *Juss.;* Podophylleæ. *Lindley.*

Gen. Ch. Calyx three-leaved. *Corolla* nine-petaled. *Berry* one-celled, crowned with the stigma. *Willd.*

Podophyllum peltatum. Willd. *Sp. Plant.* ii, 1141; Bigelow, *Am. Med. Bot.* ii. 34; Barton, *Med. Bot.* ii. 9. The may-apple, known also by the name of *mandrake*, is an indigenous herbaceous plant, and the only species belonging to the genus. The root is perennial, creeping, usually several feet in length, about one quarter of an inch thick, of a brown colour externally, smooth, jointed, and furnished with radicles at the joints. The stem is about a foot high, erect, round, smooth, divided at top into two petioles, and supporting at the fork a solitary one-flowered peduncle. Each petiole bears a large peltate, palmate leaf, with six or seven wedge-shaped lobes, irregularly incised at the extremity, yellowish-green on their upper surface, paler and slightly pubescent beneath. The flower is nodding. The calyx is composed of three oval, obtuse, concave, deciduous leaves. The corolla has from six to nine white, fragrant petals, which are obovate, obtuse, concave, with delicate transparent veins. The stamens are from thirteen to twenty, shorter than the petals, with oblong yellow anthers of twice the length of the filaments. The stigma is sessile, and rendered irregular on its surface by numerous folds or convolutions. The fruit is a large oval berry, crowned with the persistent stigma, and containing a sweetish fleshy pulp, in which about twelve ovate seeds are embedded. It is, when ripe, of a lemon-yellow colour, interrupted by round brownish spots.

The plant is extensively diffused throughout the United States, growing luxuriantly in moist shady woods, and in low marshy grounds. It is propagated by its creeping root, and is often found in large patches. The flowers appear about the end of May and beginning of June; and the fruit ripens in the latter part of September. The leaves are said to be poisonous. The fruit has a subacid, sweetish, peculiar taste, agreeable to some palates, and may be eaten freely with impunity. From its colour and shape it is sometimes called *wild lemon.* The root is the officinal portion, and is said to be most efficient when collected after the falling of the leaves. It shrinks considerably in drying.

Properties. The dried root is in pieces about two lines in thickness, with swelling, broad, flattened joints at short intervals. It is much wrinkled lengthwise, is yellowish or reddish-brown externally, and furnished with fibres of a similar, but somewhat paler colour. The fracture is short and irregular, and the internal colour whitish. The powder is light yellowish-gray, resembling that of jalap. The root in its aggregate state is nearly inodorous; but in powder has a sweetish not unpleasant smell. The taste is at first sweetish, afterwards bitter, nauseous, and slightly acrid. The docoction and tincture are bitter. A peculiar bitter principle has been discovered in the root by William Hodgson, jun. of Philadelphia. It is in pale brown shining scales, unalterable in the air, very sparingly soluble in cold water, much more soluble in boiling water, soluble also in ether, and freely so in boiling alcohol. It has neither acid nor alkaline properties. Nitric acid dissolves it with effervescence, producing a rich deep red colour. Its taste, at first not very decided in consequence of its feeble solubility, becomes at length very bitter and permanent; and its alcoholic solution is intensely bitter. Should it be found to be the purgative principle of the plant, it would be entitled to the name of *podophyllin.* It may be obtained by boiling the root with quicklime in water, straining the decoction, precipitating the lime with sulphate of zinc, evaporating the clear solution to the consistence of an extract, treating this with cold alcohol of 0.817, filtering and evaporating the alcoholic solution, and treating the residue with boiling distilled water, which deposites the bitter principle on cooling. (*Journ. of the Phil. Col. of Pharm.* iii. 273.)

Medical Properties and Uses. Podophyllum is an active and certain cathartic, producing copious liquid discharges without much griping or other unpleasant effect. In some cases it has given rise to nausea and even vomiting, but the same result is occasionally experienced from every active cathartic. Its operation resembles that of jalap; but is rather slower, and is thought by some to be more drastic. It is applicable to most inflammatory affections which require brisk purging; and is much employed in various parts of the country, especially combined with calomel, in bilious fevers and hepatic congestions. It is also frequently used in connexion with the supertartrate of potassa in dropsical, rheumatic, and scrofulous complaints.

The dose of the powdered root is about twenty grains. An extract is prepared from it possessing all its virtues in a smaller bulk. (See *Extractum Podophylli.*) In minute doses frequently repeated, podophyllum is said to diminish the frequency of the pulse, and to relieve cough; and for these effects is sometimes used in hæmoptysis, catarrh, and other pulmonary affections.

Off. Prep. Extractum Podophylli, *U.S.* W.

* * *

POLYGALA RUBELLA. *U.S. Secondary.*

Bitter Polygala.

"Polygala rubella. Planta. *The plant.*" *U.S.*

Polygala. See SENEGA.

Polygala rubella. Willd. *Sp. Plant.* iii. 875; Bigelow, *Am. Med. Bot.*

iii. 129.—*P. polygama.* Walter, *Flor. Car.* 179; Pursh, *Flor. Am. Sept.* 465. This species of Polygala is an indigenous, perennial plant, with a branching, somewhat fusiform root, which sends up annually numerous simple, smooth, and angular stems, from four to eight inches in height. The leaves are scattered, sessile, obovate or linear lanceolate, attenuated towards the base, obtuse, and mucronate. The flowers are purple, and in elongated terminal racemes. From the base of the stem proceed other racemes, which lie upon the ground, or are partially buried under it, and bear incomplete but fertile flowers, the calyx of which is without wings.

This plant is found in many parts of the United States, preferring a dry sandy or gravelly soil, and flowering in June and July. The whole plant is officinal. It has a strong and permanent bitter taste, which it yields to water and alcohol.

Medical Properties and Uses. In small doses it is tonic, in larger laxative and diaphoretic. The infusion of the dried plant has been usefully employed to impart tone to the digestive organs. (*Bigelow.*) It appears to be closely analogous in medical virtues to the *Polygala amara* of Europe, which is used for a similar purpose. W.

PORRI RADIX. *Lond.*

Leek Root.

"Allium Porrum. *Radix.*" *Lond.*

Poireau, *Fr.;* Gemeiner Lauch, *Germ.;* Porro, *Ital.;* Puerro, *Span.*

Allium. See ALLIUM.

Allium Porrum. Willd. *Sp. Plant.* ii. 64. "Stem flat-leaved, umbelliferous. Stamens tricuspidate. Root tunicated."

The leek is a biennial bulbous plant, growing wild in Switzerland, and cultivated in the gardens of Europe and this country for culinary purposes. All parts of it have an offensive pungent odour, and an acrid taste, dependent on an essential oil, which is in great measure dissipated by decoction, and may be obtained separate by distillation. The bulb, which is the officinal portion, consists of concentric layers, like the onion, which it resembles in medical properties, though somewhat milder. It is gently stimulant, with a peculiar direction to the kidneys. The expressed juice may be given in the dose of a fluidrachm, mixed with syrup. This species of Allium is not used medicinally in the United States. W.

POTASSIUM.

Potassium.

Potassium, *Fr.;* Potassium, Kalimetall, *Germ.;* Pottasio, *Ital.;* Potasio, *Span.*

Potassium is a peculiar metal forming the basis of a number of importan medicinal preparations. It was discovered iu 1807 by Sir H. Davy, wh obtained it by the agency of galvanic electricity; but it is procured mor readily by heating the hydrate of potassa to whiteness in contact with iro or charcoal, whereby the alkali is decomposed, yielding up its oxygen to th iron or charcoal, while its metallic radical is set free.

Potassium is solid, softer and more ductile than wax, easily cut with knife, and of a silver-white colour. A newly cut surface is exceedingl brilliant; but the metal quickly tarnishes by combining with the oxygen of the air, and assumes the appearance of lead. It possesses a remarkably strong affinity for oxygen, and is capable of taking that element from every other substance. On account of this property it requires to be kept in liquids, such as naphtha, which are devoid of oxygen as a constituent. Its sp. gr. is between 0.8 and 0.9, its melting point 136°, and its equivaleut number 39.15. When thrown upon water it swims, takes fire, and burns with a rose-coloured flame, combining with oxygen, and generating potassa which dissolves in the water. It forms numerous combinations, uniting with most of the non-metallic bodies, and several of the metals. It combines in two proportions with oxygen, forming a protoxide (dry potassa) of a gray, and a peroxide, of a yellowish-brown colour; the former containing one, and the latter three equivalents of oxygen to one of metal. It combines also with chlorine and iodine, forming the chloride and iodide of potassium, the latter of which is officinal. Its protoxide (dry potassa) is a very strong salifiable base, existing in nature always in a state of combination, and forming with acids a numerous and important class of salts. Of these, the acetate, carbonate, bicarbonate, hydrate (caustic potassa), nitrate, sulphate, supersulphate, tartrate, and supertartrate are officinal, and will be described under their respective titles, to which, for their properties, the reader is referred. B.

POTASSÆ ACETAS. *U.S., Lond., Dub.*

Acetate of Potassa.

Off. Syn. ACETAS POTASSÆ. *Ed.*

Diuretic salt, Foliated earth of tartar, Digestive salt of Sylvius; Acétate de potasse, *Fr.;* Essigsaures Kali, *Germ.;* Acetato di potasso, *Ital.*

Acetate of potassa is included among the preparations in the Pharmacopœias of the British Colleges; but is perhaps more properly placed in the catalogue of the Materia Medica in the United States Pharmacopœia.

Preparation, &c. This salt is prepared by saturating a filtered solution of carbonate of potassa with distilled vinegar or acetic acid, and heating the mixture to assist the disengagement of the carbonic acid. An excess of acid is now added, which prevents the potassa from colouring the solution by acting on any small portion of mucilage which may exist in the acid. The solution is then evaporated to three-fourths, care being taken to maintain its excess of acid. It is now somewhat coloured, and being allowed to cool, and to remain at rest for some hours, is afterwards decanted. The decanted liquid is next mixed with a fifth of its weight of animal charcoal, boiled for a few moments and filtered; after which it is evaporated to a pellicle. The concentrated solution is next evaporated to dryness, in separate small portions, in a shallow silver capsule, with a moderate fire. As the pellicles form on the surface, they are constantly scraped off to the edges of the capsule, and the heat is continued until the whole is converted into these pellicles. The desiccation being completed, the capsule is covered with paper; and its contents, when cool, are transferred to a perfectly dry bottle, which must be well stopped.

The above process is merely a case of single elective affinity, the acetic acid combining with the potassa, and expelling the carbonic acid, which causes the effervescence. This salt may be obtained also by double decomposition between acetate of lead and sulphate of potassa. When thus procured, it is very white and pure, but liable to the objection, for medical use, that it may possibly contain lead. Another method by double decomposition is between the acetate of lime and sulphate of potassa; but when thus prepared, the salt is apt to contain some of the alkaline sulphate.

The following is an outline of the processes adopted by the British Colleges for obtaining this salt. The London College uses the stronger acetic acid, obtained by purifying pyroligneous acid, for decomposing the carbonate of potassa, and directs the evaporation of the solution to be conducted in such a manner as to convert the whole into successive pellicles. The Edinburgh and Dublin Colleges direct distilled vinegar and the carbonate of potassa from tartar for making the salt; and after subjecting it to exsiccation and cautious fusion, redissolve it in water, filter the solution and evaporate it to such an extent that it may concrete into a crystalline mass upon cooling.

Properties. Acetate of potassa when pure, is a white salt, possessing a pungent saline taste, which diffuses a peculiar warmth over the palate. When unskilfully prepared, it is apt to be more or less coloured; and as there is some difficulty in obtaining it free from colour, the different processes for preparing it are particularly directed to attaining this object. Its state of aggregation differs with the manner in which it has been prepared. When obtained by removing the pellicles from the solution of the salt as it evaporates, it is in the form of light, white, spongy masses; when by concretion upon the cooling of the concentrated solution, it presents a flaky or foliated texture. The latter form is that in which it is generally found in our shops. This salt is extremely deliquescent, and if exposed to the air becomes converted into a liquid of an oleaginous appearance. It is on account of this property that it must always be preserved in well stopped bottles. It dissolves in about half its weight of water, and twice its weight of alcohol. Exposed to a high temperature it fuses, and, upon slow cooling, assumes the form of a foliated mass. If the heat be continued, it is decomposed, and resolved into water, oil, and ammonia, which are volatilized, and carbonate of potassa with charcoal, which remains as a fixed residue. When treated with sulphuric acid, acetic acid is set free, and sulphate of potassa formed. The most usual impurities which it contains are the sulphate and tartrate of potassa, and the salts of lead and copper. The presence of a soluble sulphate will be shown by nitrate of baryta producing a precipitate. If tartrate of potassa be present, the salt will not be entirely soluble in alcohol. Lead and copper may be detected by sulphuretted hydrogen and ferrocyanate of potassa; the former test producing with the lead a blackish, and the latter with the copper a brown precipitate.

Acetate of potassa is not unfrequently a constituent in organic substances. According to Vauquelin, it is present in the sap of nearly all trees; and it has been detected in some animal fluids, as in milk.

Incompatibles. This salt is decomposed by sulphuric, muriatic, and nitric acids, acetic acid being expelled. It is incompatible also with the sulphates of soda and magnesia, the muriates of ammonia and magnesia, the tartrate of potassa and soda (Rochelle salt), the corrosive chloride of mercury, nitrate of silver, and several other metallic and earthy salts.

Composition. It consists of one equivalent of acetic acid 51.48, one of potassa 47.15, and two of water 18 = 116.63.

Medical Properties and Uses. Acetate of potassa acts as a diuretic in doses of from a scruple to a drachm, and as a mild cathartic when given to the extent of two or three drachms. It is employed in dropsies, and often with good effect. The late Dr. Duncan considered it to be a medicine of great efficacy, and one of the best saline deobstruents that we possess. We have ourselves used it in dropsical affections, and can bear testimony to its powers. The acetate, ready prepared, being an expensive preparation, the salt, equally efficacious, may be made extemporaneously in the liquid form by saturating distilled vinegar with the carbonate of potassa. Two drachms of the carbonate saturated with vinegar, will sometimes produce in hydropic cases ten or twelve stools, and a copious discharge of urine. (*Duncan.*) Acetate of potassa, like the other alkaline salts containing a vegetable acid, may be given in the uric acid diathesis, to *alkalize* the urine; for the experiments of Wöhler have shown that the acid of these salts undergoes decomposition in the digestive and assimilating processes, while the alkali enters the current of the circulation.

Acetate of potassa is used pharmaceutically for obtaining acetic acid by the Dublin College, and in the preparation of acetate of mercury, the tinctures of acetate of iron, and the tincture of acetate of zinc. It enters into no officinal preparation.

B.

POTASSÆ CARBONAS IMPURUS. *U.S.*

Impure Carbonate of Potassa.

Off. Syn. POTASSA IMPURA. *Lond.;* SUB-CARBONAS POTASSÆ IMPURUS, *Ed.;* LIXIVUS CINIS. *Dub.*

Pearlash, Pearlashes, Impure potassa, Impure sub-carbonate of potassa; Potasse du commerce, *Fr.;* Kohlensaures Kali, Pottasche, *Germ.;* Potasch, *Dutch.;* Potaske, *Dan.;* Potaska, *Swed.;* Potassa del commercio, *Ital.;* Cenizas claveladas, *Span.*

The alkali potassa, using this term in its strict sense, is the protoxide of the metal potassium. (See *Potassium.*) It exists in various states of combination and of purity. In its most impure state, it is the common *potash* of commerce. This, subjected to calcination, becomes somewhat purer, and is called *pearlash*, the form of the alkali which is intended to be designated by the officinal name at the head of this article.

Natural State and Preparation. Potash and pearlash of commerce are rocured from the ashes of wood, by lixiviation and the subsequent evapo-ation of the solution obtained. The alkali exists in the wood, principally in he state of acetate; and being of a fixed and incombustible nature, is left ehind after the incineration. The wood is burnt on the ground, in a place heltered from the wind. The ashes which are left, consist of a soluble nd insoluble portion. The soluble part is made up of carbonate of potassa, ogether with the sulphate, phosphate, and silicate of potassa, and the chlo-ides of potassium and sodium; and the insoluble portion, of carbonate and ubphosphate of lime, alumina, silica, the oxides of iron and manganese, and little carbonaceous matter that had escaped incineration. The ashes are xiviated in barrels with the addition of a portion of lime, and the soluble sub-tances above mentioned are taken up. The lixivium is then evaporated in on kettles, which for several days are constantly kept full. The evapora-on is continued until the mass has become of a black colour, and of the nsistence of brown sugar. It is now subjected to as powerful a heat as n be raised by the best wood fire for a number of hours. During the rogress of the fusion, the combustible impurities are for the most part de-royed, and a gaseous matter is emitted, which agitates the more fluid part. Vhen the fusion is complete, the liquid becomes quiescent, and looks like melted iron. It is now transferred, by means of large iron ladles, to iron pots, where it congeals in cakes. These are broken up into fragments and packed in tight barrels, and constitute the *potash* of commerce. (*Dr. G. A. Rogers*, in Silliman's Journ.) If it be intended to make *pearlash*, the process is different. In this case the black matter of the consistence of brown sugar, (called *black salts* by our manufacturers,) instead of being fused, is transferred from the kettles to a large oven-shaped furnace, so constructed that the flame is made to play over the alkaline mass, which in the meantime is stirred by means of an iron rod. The ignition is in this way continued, until the combustible impurities are burnt out, and the mass, from being black, becomes of a dirty white colour. (*Rogers.*)

The ashes of plants amount generally to not more than a few parts in the hundred; and of these, only a portion consists of carbonated potassa. The different parts of the same vegetable, and, for a stronger reason, different plants, furnish variable quantities of ashes. Ligneous plants furnish less than herbaceous, the trunk less than the branches, and the branches less than the leaves. The bark yields more ashes than the interior portions; and the leaves of trees which drop their leaves in winter, more than those of evergreens. The dried stems of potatoes have been said to yield the impure carbonate of potassa, to the extent of five and a half per cent.; but this statement has not been confirmed. The ashes of the poke contain a large proportion of this alkali. (See *Phytolaccæ Baccæ et Radix.*) The pine, on the contrary, contains nearly no potash.

Commercial History. Pot and pearlash are made in those countries in which forests abound. Accordingly the alkali is extensively manufactured in Canada and the United States, and constitutes a very important export of this country. It is prepared particularly in the state of New York, which is supposed to furnish three-fourths of our export of this alkali. It is also produced in considerable quantities in the northern countries of Europe, especially in Russia, and on the shores of the Baltic. It is of different qualities as it occurs in commerce, being more or less pure; and is generally distinguished by the country or place of manufacture, as *American*, *Russian*, *Dantzic* potash, &c.

Properties. Potash is in the form of fused masses of a stony appearance and hardness, and caustic burning taste. Its colour is variegated; but reddish and dark brown are the predominant hues. When exposed to the air it absorbs moisture, and deliquesces; and if sufficiently long exposed, finally becomes liquid. *Pearlash* is of a white colour, with usually a tinge of blue. As it occurs in commerce, it is in tight casks, containing about three hundred and fifty pounds, in which it forms one entire hard concrete mass. In the shops it is found in coarse powder, intermingled with lumps, as dug out of the casks, presenting an opaque granular appearance, like salt, or Havana sugar. It is a deliquescent salt, and has a burning alkaline taste, but no smell. It is soluble in water, with the exception of impurities, which are more or less in quantity, according to the quality of the alkali, of which three sorts exist in the market. It differs from potash principally in containing less combustible impurities and in being less caustic and deliquescent, and commands in the market from five to fifteen dollars per ton more than potash. The colouring matter of both these forms of alkali is derived from carbonaceous impurities, and small portions of iron and manganese.

Composition. The basis of both pot and pearlash is carbonate of potassa; but this is associatad with certain salts, the principal of which are sulphate of potassa and chloride of potassium, and with insoluble impurities.

Several varieties of potash found in commerce were analyzed by Vauquelin, whose results are contained in the following table. The quantity examined of each kind was 1152 parts.

KINDS OF POTASH.	Caustic Hydrate of Potassa.	Sulphate of Potassa.	Chloride of Potassium.	Insoluble Residue.	Carbonic Acid and Water.
American potash.	857	154	20	2	119
Russian potash.	772	65	5	56	254
Pearlash.	754	80	4	6	308
Potash of Trèves.	720	165	44	24	199
Dantzic potash.	603	152	14	79	304
Potash of Vosges.	444	148	510	34	16

By the above table it is perceived, that the American potash contains the most alkali, and next the Russian. Pearlash, it is seen, is more rich in carbonic acid than potash; and this result of analysis corresponds with the qualities of the two substances as prepared in the United States; potash being known to be far more caustic than pearlash. The greater causticity of the American potash, compared with most of the varieties of Europe, probably depends upon the use of lime with us, which is not mentioned as being employed in the preparation of the commercial alkali in the best European works. The usual saline impurities are shown by the table to be sulphate of potassa and chloride of potassium. The insoluble residue consists principally of carbonaceous matter, which has escaped incineration. Sometimes, however, insoluble matters are fraudulently added, such as brick-dust, sand, and other substances.

As the potash of commerce is valuable in the arts in proportion to the quantity of real alkali which it contains, it becomes important, in so variable a substance, to possess an easy method of ascertaining its quality in that respect. The process by which this is accomplished is called *alkalimetry*, and the instrument used an *alkalimeter*. The best mode of conducting the assay, which is applicable to the commercial forms of soda as well as those of potassa, is that proposed by Mr. Faraday, and described by Dr. Turner as follows. Take a cylindrical tube, sealed at one end, nine and a half inches long, and three quarters of an inch in diameter, and pour into it one thousand grains of water, marking with a file the point at which the water stands. Divide the space occupied by the water into one hundred equal parts, graduating from above downwards; and opposite to the numbers 23.44, 48.96, 54.63, and 65 severally, write the words soda, potassa, carbonate of soda, and carbonate of potassa. Then prepare a dilute sulphuric acid, having the specific gravity 1.127, which may be formed by adding to the strong acid, about four times its volume of distilled water. An acid of this strength, if added so as to reach to any one of the heights denoted by the above numbers, will be just sufficient for neutralizing one hundred grains of the alkali written opposite to it. Suppose, for example, that the dilute acid be added until it stands opposite to the word carbonate of potassa, we shall then have the exact quantity necessary to neutralize one hundred grains of that carbonate; and if we add pure water, until the liquid reaches to 0, or the beginning of the scale, it is evident that the acid has been brought to the bulk of a hundred measures, each of which would be competent to neutralize one grain of the carbonate in question. All that is now necessary in order to ascertain the quality of any commercial sample of this carbonate, is to dissolve one hundred grains of it in warm water, filter the solution to remove insoluble impurities, and add by degrees the dilute acid from the tube until the solution is exactly neutralized, as shown by litmus paper. The number of divisions of acid expended in attaining this point, may be read off from the tube; and for each division one grain of real carbonate is indicated.

Pharmaceutical Uses. Pearlash is never used as a medicine in regular practice, being considered as too impure; but it is employed pharmaceutically in several processes. The Dublin College uses it for depriving rectified spirit of water, in the process for strengthening it; and it is directed to be purified, in all the Pharmacopœias, to form the carbonate of potassa.

Off. Prep. Potassæ Carbonas, *U.S.*, *Lond.*, *Ed.*, *Dub.* B.

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POTASSÆ NITRAS. *U.S.*, *Lond.*, *Dub.*

Nitrate of Potassa.

Off. Syn. NITRAS POTASSÆ. *Ed.*

Nitre, Saltpetre; Nitrum, *Lat.;* Nitrate de potasse, Azotate de potasse, Nitre, Saltpêtre, *Fr.;* Salpeter-saures Kali, Salpeter, *Germ.*, *Dutch*, *Dan.*, *Swed.;* Nitro, *Ital.*, *Span.*, *Port.*

Nitre or saltpetre is both a natural and artificial production. It is found ready formed in many countries, existing in the soil on which it forms a saline efflorescence, in the fissures of calcareous rocks, and in caves. It has been found in different parts of Europe, in Egypt, and in Peru; but the country in which it is most abundantly produced is India, from which the principal part is furnished for the demands of commerce. The value of our imports of crude saltpetre from India for 1832 exceeded four hundred thousand dollars. In the United States it is found in Georgia, Tennessee, Virginia, Maryland, Ohio, and Kentucky. It exists, in these States, for the most part in caverns situated in limestone rock, called saltpetre caves, and is associated with nitrate of lime. The earths contained in them are lixiviated, and yield, according to their richness, from one to ten pounds of crude nitre to the bushel. These caves are particularly numerous in Kentucky, and furnished a large portion of the nitre consumed in the United States during the late war. It exists also in the vegetable kingdom, having been found in borage, tobacco, bugloss, parietaria, hemlock, and the sunflower. The artificial sources of nitre are certain mixtures of animal and vegetable substances with wood-ashes and calcareous matter, called nitre beds; and certain materials, impregnated with saltpetre, consisting principally of old plaster, derived from the demolition of old buildings.

Preparation from its Natural Sources. In India the soil of the nitre districts is lixiviated, and the lixivium obtained evaporated in shaded shallow pits, until it crystallizes. Where the material is less rich in nitre, and contains nitrate of lime, as is the case with the earths from our saltpetre caves, it is necessary to convert the latter salt into nitrate of potassa by the addition of wood-ashes.

Artificial Preparation. The plan of forming saltpetre in artificial nitre-beds is principally practised in Germany; while the method of obtaining it from old plaster rubbish is followed in France. *Artificial nitre-beds* are formed of animal and vegetable remains, together with ashes and calcareous earth, which are mixed up with a portion of loose soil and placed under sheds, to shelter them from the rain; while the sides are left open to permit the free access of air. The matter is disposed in little ranges or heaps, which are frequently turned over with a spade, and sprinkled with urine, as a substance containing a large quantity of nitrogen. At the end of two or three years the nitrogen is converted into nitric acid, and this, uniting with the potassa existing in the vegetable remains, forms nitre. When the contents of the bed contain about four ounces of the salt for every cubic foot of the materials, they are deemed fit to be lixiviated. The lixiviation is performed with boiling water, which is repeatedly thrown upon fresh portions of the mass, until the solution obtained is sufficiently strong. The lixivium is of a brown colour, and contains chiefly the nitrate of potassa, but at the same time more or less of the nitrates of lime and magnesia, and of common salt. The earthy nitrates are then decomposed by a solution of wood-ashes, which, by furnishing potassa, converts them into nitre, and precipitates the earths. The solution being further evaporated, the common salt rises to the surface as a scum, and is removed. The solution is then allowed to cool, and the nitre crystallizes in dirty white crystals, called crude nitre.

When obtained from old plaster rubbish, the material is reduced to powder and lixiviated, in order to exhaust it of every thing soluble. The solution is found to contain the nitrates of potassa and lime, and common salt, and is treated with wood-ashes, which convert the nitrate of lime into nitrate of potassa, with precipitation of the earth as a carbonate. The liquor is separated from the precipitate and concentrated by heat; and the common salt as it rises to the surface is skimmed off. When the solution is so strong as to mark 45° of Baumé's areometer, it is allowed to cool and crystallize; and the crystals form the crude nitre of this process. The salt obtained in this way generally contains from 85 to 88 per cent. of pure nitre; the remainder being made up of chloride of sodium, and certain deliquescent salts. The details of the above process as practised in Paris, are given with minuteness by Thenard. (*Traité de Chimie, sixième édit.* 1834, tome iii. p. 340.

Purification. Nitrate of potassa, as first obtained, either from its natural or artificial sources, is called in commerce *crude saltpetre*, and requires to be purified or refined before it can be used in medicine or in most of the arts. The process, which is founded principally on the fact of the greater solubility of nitre than of common salt in hot water, is conducted in the following manner in France. Thirty parts of the saltpetre are boiled with six parts of water, and the portion which remains undissolved, or is deposited, consisting of common salt, is carefully removed. As the ebullition proceeds, a little water is added from time to time, to hold the nitre in solution. When common salt ceases to be separated, the solution is clarified with glue, and more water is added at intervals, until the whole amounts, including that previously added, to ten parts. The clear solution is now transferred to large, shallow, copper coolers, where it is agitated with wooden instruments, to hasten the cooling, and to cause the nitre to crystallize in small grains. The purification is completed by washing the salt with water, or a saturated solution of nitre, in a kind of wooden hopper, with holes in its bottom stopped with pegs. The liquid employed is allowed to remain in contact with the nitre for several hours, at the end of which time it is permitted to drain off by taking out the pegs. The salt being now dried, its purification is completed.

In Sweden, the process of purification is somewhat different. The solution of the crude nitre is boiled, until a saline crust (common salt) forms on its surface, and until it is so far concentrated that a small portion of it crystallizes upon cooling. The crust being removed, the solution is filtered, and diluted with 1-48th of water, with a view to retain in solution the common salt, which, being somewhat less soluble in cold than in boiling water, would otherwise be in part precipitated on refrigeration. The solution is now allowed to cool, and, at the moment crystals begin to form, is stirred constantly to cause the salt to crystallize in small grains. The granular salt is then washed after the French method, as above described, dried, and being fused, is cast in sheet iron moulds, so as to form masses, each weighing from ten to twenty pounds. The preparation of nitre in this manner by fusion is, according to Berzelius, attended with several advantages; such as its occupying less space, its losing nothing by waste in transportation, and its presenting in this state an obvious index of its quality. This index is the character of its fracture. When the salt is perfectly pure, this is radiated, the radii being generally large. The presence of 1-80th of common salt renders the radii smaller; and of 1-40th or a larger quantity, produces a zone in the substance of the mass, devoid of the radiated structure, or causes this structure to disappear entirely. On the other hand, the process by fusion has the disadvantages of converting the salt in part into nitrite when heated too high, and of rendering it difficult to pulverize.

Commercial History. Nitre is received in this country from Calcutta in the state of crude saltpetre, packed in grass cloth bags, containing from one hundred and fifty to one hundred and seventy-five pounds. The greater portion of it arrives at Boston, which city carries on a very brisk trade with Calcutta. Its quality varies considerably. That which comes in dirty yellow crystals is called *crude saltpetre;* while the finer lots, in small, comparatively clear crystals, approaching to white, are called *East India refined.* Very little crude saltpetre is at present prepared in the United States, on account of the low price of that from India, which for the average of the few last years has been only seven and a half cents a pound. The *refined saltpetre* is almost exclusively prepared by our own chemists; and a considerable portion of it is exported.

As connected with the subject of saltpetre, it may be proper, in this place, to mention what is called *South American saltpetre*, considerable quantities of which have been received within a few years from Peru. This substance is the *nitrate of soda*, and comes in bags containing about two hundred and seventy pounds of the salt in the crude state. This salt is coming into use with our manufacturing chemists, and is better suited than nitre for preparing nitric and sulphuric acids, on account of the greater proportional quantity of acid which it contains. It is, however, not applicable to the purpose of making gunpowder, from its tendency to absorb moisture.

Properties. Nitre is a white salt, possessing a sharp, cooling, and slightly bitterish taste, and generally crystallized in long, striated, semitransparent, six-sided prisms, with dihedral summits. It dissolves in four or five times its weight of cold, and in about two-fifths of its weight of boiling water; but is insoluble in absolute alcohol. It undergoes no alteration in the air, unless this be very moist. It contains no water of crystallization; but is apt to hold a portion of liquid, mechanically lodged within the substance of the crystals. This is particularly the case with the *large* crystals, and, according to Berzelius, is a source of impurity; as the liquid in question is a portion of the mother-waters in which they were formed. It is on this account that Berzelius recommends that the solution of the purified salt should be made by agitation to shoot into *small* crystals. When exposed to heat, nitre fuses at about 662°. (*Thenard.*) The fused mass, when cast in moulds, or forme into little circular cakes, constitutes that form of nitre kept in the shops under the name of *crystal mineral* or *sal prunelle.** If the heat be increased, the salt is decomposed, evolves pure oxygen, and is reduced to the state of a nitrite. Upon a further continuance of the heat, the nitrous acid itself is decomposed, and a large additional quantity of oxygen is evolved, contaminated, however, with more or less nitrogen. The residuum, after the gaseous matter has ceased to come over, is, according to Berzelius, a compound of potassa with nitric oxide; but, sometimes at least, it is the peroxide of potassium, as was observed about the same time by Mr. Phillips of London and Dr. Bridges of Philadelphia. On account of the large quantity of oxygen which it contains, nitre increases the combustion of many substances in a remarkable degree. When thrown on burning coals, it deflagrates with bright scintillations. Mixed with half its weight of sulphur, and two-thirds of its weight of pearlash, it forms a compound, powerfully detonating when struck with a hammer. Nitre may be readily recognised by its effect in increasing the combustion of live coals, when thrown upon them; and by evolving white or reddish vapours on the affusion of sulphuric acid. When fused, its radiated structure is a test of its purity. Its most usual impurity is common salt, which injures its quality for the manufacture of gunpowder. The presence of this contaminating salt is readily detected by nitrate of silver. The refined or purified saltpetre of commerce may be deemed the officinal nitre, and is sufficiently pure for medical use. Nevertheless, the Dublin College, with needless refinement, has given a formula for its purification. (See *Potassæ Nitras Purificatum*, Dub.)

Composition. Nitrate of potassa is composed of one equiv. of nitric acid 54.15, and one of potassa 47.15=101.3.

Medical Properties and Uses. Nitre is considered refrigerant and antiphlogistic, and is much used in inflammatory diseases. It is known to be a powerful antiseptic. It generally promotes the secretion of urine and sweat, lessens the heat of the body and the frequency of the pulse, and has a tendency to keep the bowels in a soluble condition. It is very frequently prescribed with tartar emetic and calomel, forming a combination usually called the *nitrous powder*, which promotes most of the secretions, particularly those of the liver and skin, and which in many cases is advantageously employed in lessening and modifying febrile excitement. The formula usually preferred is eight or ten grains of nitre, the eighth of a grain of tartar emetic, and from a fourth to half of a grain of calomel, exhibited every two or three hours. Nitre is frequently given in active hemorrhages, particularly hæmoptysis, and is useful as an ingredient in gargles, in certain stages of inflammatory sore-throat. In the form of sal prunelle, it is rubbed with advantage on chapped lips. The dose is from five to fifteen grains, dissolved in water or some mucilaginous fluid, and repeated every two or three hours. From one to three drachms may, in this manner, be exhibited in the course of the day. If given too freely, or for too long a period, it is apt to excite pains of the stomach. In an over-dose, (half an ounce to an ounce or more,) sometimes taken by mistake for sulphate of soda, it causes violent symptoms; such as intense pain in the stomach, vomiting and purging of blood, great prostration, convulsions, and sometimes death. On dissection, the stomach and intestines are found violently inflamed. The treatment in such cases consists in the administration of mucilaginous and demulcent drinks, laudanum to allay pain and irritation, and cordials in the sinking condition of the system.

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* The *sal prunelle*, as made in France, is a mixture of nitrate and sulphate of potassa. It is prepared by fusing a pound of pure nitre in a Hessian crucible, and throwing into the fused salt a drachm of pulverized sulphur. The sulphur immediately takes fire, and by combining with oxygen from the nitre, becomes sulphuric acid, which then combines with the potassa of this salt, and forms sulphate of potassa. The mixed salts are then poured into a heated silver basin, where they are allowed to congeal in thin layers. This preparation is said to be called sal prunelle, because formerly it was the custom to give it a purple colour, resembling that of the plum.

Pharmaceutical Uses, &c. In pharmacy nitre is employed to form crocus of antimony, (see *Edinburgh process for tartar emetic,*) and to obtain nitric acid, (see *Acidum Nitricum,*) sweet spirit of nitre by the United States formula, and purest carbonate of potassa (*salt of tartar.*) It enters into the composition of moxa, (see *Moxa*, Dub.,) and is employed in preparing the sulphate of potassa with sulphur of the Edinburgh College. In the laboratory it is used as an oxidizing agent, and to yield oxygen at a red heat. One pound of it will furnish four hundred and fourteen pints of oxygen, sufficiently pure for experiments of illustration. In the arts, it is employed in the production of aquafortis, the manufacture of sulphuric acid, (see *Acidum Sulphuricum,*) and the fabrication of gunpowder. It is this last use which causes its principal consumption. In domestic economy, it is applied to the purpose of preserving meat, especially beef, to the fibre of which it communicates a red colour and considerable firmness.

Off. Prep. Potassæ Nitras Purificatum, *Dub.;* Trochisci Nitratis Potassæ, *Ed.;* Unguentum Sulphuris Compositum, *U.S., Lond.* B.

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POTASSÆ SULPHAS. *U.S., Lond., Dub.*

Sulphate of Potassa.

Off. Syn. SULPHAS POTASSÆ. *Ed.*

Vitriolated tartar; Tartarum vitriolatum, Arcanum duplicatum, Sal de duobus, *Lat.;* Sulfate de potasse, Potasse vitriolée. *Fr.;* Schwefelsaures Kali, Vitriolisirtir Weinstein, *Germ.;* Solfato di potassa, *Ital.*

This salt is placed among the preparations by the Dublin College; in the Materia Medica list, as well as among the Preparations, by the London and Edinburgh Colleges; and in the Materia Medica list only in the United States Pharmacopœia. The latter position is its proper one, as the salt is manufactured for the most part on the large scale.

Preparation. Several chemical processes give rise to sulphate of potassa as a secondary product. Thus it is produced in the distillation of nitric acid from a mixture of nitre with sulphuric acid or the sulphate of iron; in the decomposition of sulphate of magnesia by carbonate of potassa, in forming carbonate of magnesia, and during the combustion of the mixture of nitre and sulphur in the manufacture of sulphuric acid. (See *Acidum Nitricum,* and *Acidum Sulphuricum.*) When nitric acid is obtained by calcining a mixture of nitre and sulphate of iron, the residue consists of peroxide of iron and sulphate of potassa, the latter of which being alone soluble, is separated by means of water, and crystallized from its solution. The residue of the combustion of sulphur and nitre, in making sulphuric acid, is an impure sulphate of potassa mixed with sulphur, and is not purified for use in medicine, but sold to the alum makers; the sulphate of potassa being one of the saline ingredients of that double salt.

The British Colleges agree in obtaining sulphate of potassa from the salt which remains after the distillation of nitric acid. This salt is a supersulphate of potassa, and must be so prepared as to be brought to the neutral state. The London and Dublin Colleges effect this purpose by saturating the excess of acid with carbonate of potassa; the Edinburgh College, by removing the excess by the addition of carbonate of lime, which converts it into an insoluble sulphate of lime. The directions of the London College, which are the most precise, are to dissolve two pounds of the acidulous salt in two gallons of boiling water, to add sufficient carbonate of potassa to saturate the excess of acid, to boil the solution to a pellicle, and, after filtration, to set it aside to form crystals, which, being separated by pouring off the mother-water, are to be dried on blotting paper. Mr. Phillips considers the Edinburgh process to be the best, as it gets rid of the excess of acid; while, by the London and Dublin processes, the additional quantity of sulphate of potassa is obtained by the expenditure of carbonate of potassa, which is of more value than the sulphate. Mr. Brande, however, objects to the Edinburgh formula, that the separation of the sulphate of lime renders it more troublesome, while the saving, by adopting it, is but trifling.

Properties. Sulphate of potassa is a white, anhydrous salt, in the form of small aggregated, transparent, very hard crystals, permanent in the air, having the shape usually of short six-sided prisms, terminated by six-sided pyramids, and possessing a nauseous, somewhat bitter taste. It is slowly soluble in about nine times its weight of cold, and four times its weight of boiling water; but is insoluble in alcohol. When thrown upon burning coals it decrepitates, and exposed to a strong red heat it undergoes fusion. It exists naturally in ligneous vegetables, and hence is present in their ashes. Added to a solution of sulphate of alumina, it generates alum, recognised by the octohedral shape of its crystals. It is decomposed by tartaric acid, which forms bitartrate of potassa, and by the soluble salts of baryta, strontia, lime silver, and lead, forming insoluble, or sparingly soluble sulphates. It consists of one equiv. of sulphuric acid 40.1, and one of potassa 47.15=87.25.

Medical Properties and Uses. Sulphate of potassa is deobstruent and cathartic. In small doses, from a scruple to half a drachm, it operates as an aperient, and is useful in removing obstructions; in larger doses, of four or five drachms, it acts slowly as a gentle purge. Combined with rhubarb, in the proportion of about a drachm of the salt to ten grains of the root, Dr. Fordyce found it an excellent alterative cathartic in the visceral obstructions of children, characterized by a tumid abdomen and defective digestion and nutrition; and we can bear testimony to its efficacy in these cases from our own experience. Dr. A. T. Thomson states that this salt, in combination either with rhubarb or aloes, has proved in his hands "more useful than any of the other saline purgatives, in jaundice and dyspeptic affections." In the arts it is employed in making alum, and by the refiners of saltpetre for converting nitrate of lime into nitrate of potassa.

Off. Prep. Pilulæ Colocynthidis Compositæ, *Ed., Dub.;* Pulvis Ipecacuanhæ et Opii, *U. S., Lond., Ed., Dub.;* Pulvis Salinus Compositus, *Ed., Dub.*

B.

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SUPER-TARTRAS POTASSÆ IMPURUS. *Ed.*

Impure Supertartrate of Potassa.

Off. Syn. TARTARUM. *Lond.*

Crude tartar, Argol; Tartre, *Fr.;* Weinstein, *Germ.;* Tartaro volgare, *Ital.;* Tartaro *Span.*

During the fermentation of acidulous wines, a peculiar matter is deposited on the bottom and sides of the casks, forming a crystalline crust, called *crude tartar*, or *argol*. That deposited from red wine is of a reddish colour, and is called in commerce *red tartar*, while that derived from white wines is of a dirty white colour, and is denominated *white tartar*. Both kinds are essentially the same, consisting of potassa united with an excess of tartaric acid, forming supertartrate (bitartrate) of potassa, mixed with tartrate of lime, more or less colouring matter, together with lees and other matters which are deposited during the clarification of the wine. The substance in question is, therefore, an impure super-tartrate of potassa, as called by the Edinburgh College. When purified it forms the *cream of tartar* of the shops, the *bitartrate of potassa* of the chemist, which is described in the next article.

This acidulous salt exists naturally in the tamarind and grape. In the juice of the latter, it is held in solution by means of the saccharine and mucilaginous matter of the fruit. But when the juice is submitted to fermentation in the process for converting it into wine, the sugar disappears, and is replaced by alcohol, which, not being competent to dissolve the salt, allows it to precipitate. In this way, the deposition of tartar during the fermentation of wine is explained.

Off. Prep. Sub-Carbonas Potassæ Purissimus, *Ed.* B.

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POTASSÆ SUPERTARTRAS. *U.S., Lond.*

Supertartrate of Potassa.

Off. Syn. SUPER-TARTRAS POTASSÆ. *Ed.;* POTASSÆ BITARTRAS. TARTARI CRYSTALLI. *Dub.*

Cream of tartar, Crystals of tartar; Cremor tartari, *Lat.;* Tartrate acide de potasse, Crême de tartre, *Fr.;* Doppelt weinsaures Kali, Weinsteinrahm, *Germ.;* Cremore di tartaro, *Ital.;* Cremor de tartaro, *Span.*

Cream of tartar is obtained from crude tartar, the substance described in the preceeding article, by subjecting it to a process of purification. The process is conducted on a large scale at Montpelier in France, and is founded upon the property which cream of tartar possesses, of being much more soluble in hot than in cold water. The tartar, previously pulverized, is boiled with water in copper boilers. The solution, when saturated, is transferred to earthen pans, where it deposites, on cooling, a crystalline layer, nearly free from colour. This is redissolved in boiling water; and the solution, having been mixed with four or five per cent. of argillaceous earth, is evaporated to a pellicle. The clay precipitates with the colouring matter, and the clear solution, as it cools, deposites white crystals in crusts, which, upon being exposed to the open air on linen for several days, acquire an increased degree of whiteness. These constitute the crystals of tartar, or cream of tartar of pharmacy. The salt, however, as met with in the shops, is generally, for greater convenience, in the form of powder; and it is to the substance in this form, that we are accustomed to apply the name of *cream of tartar*.

Properties. Supertartrate of potassa occurs in commerce in white crystalline crusts, or masses of aggregated crystals, and is received in that state from France by our wholesale druggists, who procure its pulverization for the use of the apothecaries. In crystals it is hard and gritty under the teeth, and dissolves slowly in the mouth; in powder it has a white colour. It is a permanent salt, having an acid, not ungrateful taste, soluble in sixty parts of cold, and fifteen of boiling water, but insoluble in alcohol. When exposed to heat it is decomposed, exhales a peculiar odour, and gives rise to an acid, called *pyrotartaric*, and the usual products of the destructive distillation of vegetable matter. It is precipitated by solutions of baryta, strontia, and lime, which form insoluble tartrates, and by acetate of lead, forming tartrate of lead. With salifiable bases which form soluble tartrates, it gives rise to double salts, consisting of neutral tartrate of potassa, and the tartrate of the base added. Several of them are important medicines, and will be described under their respective heads. Cream of tartar, though sparingly soluble in water, becomes abundantly so by the addition of borax. The combination thus formed is sometimes used in medicine, and will be described under borax. (See *Sodæ Boras.*)

The cream of tartar of commerce is not a pure supertartrate of potassa. It uniformly contains tartrate of lime, amounting on an average to six per cent., but occasionally even to fourteen per cent. It is sometimes adulterated with sand, clay, and similar substances. The fraud may be easily detected, by treating the suspected salt with a warm alkaline solution, which will dissolve the cream of tartar, and leave the adulterating substances. According to Mr. Brande, purified tartar is sometimes mixed with white siliceous pebbles, bruised into small fragments.

Composition. Cream of tartar consists of two equiv. of tartaric acid 132.96, and one equiv. of potassa 47.15. It is, therefore, in precise chemical language, a *bitartrate of potassa.* When crystallized it contains one equivalent of water, which cannot be expelled without decomposing the salt.

Medical Properties and Uses. Supertartrate of potassa is cathartic, diuretic, and refrigerant. In small doses it acts as a cooling aperient, in large ones as a hydragogue cathartic, producing copious watery stools; and from his latter property, as well as its tendency to excite the action of the kidneys, it is very much used in dropsical affections. When exhibited in these liseases, it is frequently prescribed in combination with jalap. (See *Pulvis Jalapæ Compositus.*) Its solution in boiling water, sweetened with sugar, nd allowed to cool, forms an acid, not unpleasant, refrigerant drink, advanageously used in some febrile affections, and very much employed as a lomestic remedy. The beverage called *imperial* is a drink of this kind, nd is made by dissolving half an ounce of the salt in three pints of boiling vater, and adding to the solution four ounces of white sugar, and half an unce of fresh lemon peel. The dose of cream of tartar is a drachm or two s an aperient; and from half an ounce to an ounce as a hydragogue cathartic, enerally mixed with molasses. As a diuretic in dropsical cases, it is best iven in divided doses to the amount of an ounce or more in twenty-four ours, largely diluted with water.

In pharmacy, cream of tartar is employed in obtaining the neutral tartrate f potassa (soluble tartar), tartrate of potassa and soda (Rochelle salt), tarate of antimony and potassa (tartar emetic), and the tartrate of iron and otassa. Saturated by means of chalk, it forms tartrate of lime, which, ecomposed by sulphuric acid, furnishes tartaric acid. Deflagrated with itre, it is converted into a pure form of carbonate of potassa, called salt of rtar. (See *Potassæ Carbonas Purissimus.*) In the laboratory it is used procure potassa in a pure state, and in making black and white flux. *lack flux* is prepared by deflagrating cream of tartar with half its weight nitre; and *white flux*, by a similar process, using twice its weight of the tter salt.

Off. Prep. Acidum Tartaricum, *Lond.*, *Dub.*; Antimonii et Potassæ artras, *U.S.*, *Lond.*, *Ed.*, *Dub.*; Ferri et Potassæ Tartras, *U.S.*, *Lond.*, *Ed.*, *Dub.*; Potassæ Carbonas Purissimus, *U.S.*, *Dub.*; Potassæ Tartras, *U.S.*, *Lond.*, *Ed.*, *Dub.*; Pulvis Jalapæ Compositus, *Ed.*, *Dub.*; Sodæ et Potassæ Tartras, *U.S.*, *Lond.*, *Ed.*, *Dub.* B.

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PRINOS. *U.S. Secondary.*

Black Alder.

"Prinos verticillatus. Cortex. *The bark.*" *U.S.*

Prinos. *Sex. Syst.* Hexandria Monogynia.—*Nat. Ord.* Rhamni, *Juss.*; Ilicineæ, *Brongniart*, *Lindley*.

Gen. Ch. *Calyx* small, six-cleft. *Corolla* monopetalous, subrotate, six-parted. *Berry* six-seeded; seeds nuciform. *Nuttall.*

Prinos verticillatus. Willd. *Sp. Plant.* ii. 225; Bigelow, *Am. Med. Bot.* iii. 141; Barton, *Med. Bot.* i. 203. The black alder is an indigenous shrub, with a stem six or eight feet high, furnished with alternate, spreading branches, and covered with a bluish-gray bark. The leaves, which stand alternately or irregularly on short petioles, are oval, pointed, tapering at the base, acutely serrate, of a dark green colour, smooth on their upper surface, but downy on the veins beneath. The flowers are small, white, nearly sessile, and grow three or four together at the axils of the leaves. They are often diœcious. The calyx is persistent; the segments of the corolla are obtuse; the stamens usually six in number, and furnished with oblong anthers; the germ large, green, roundish, and surmounted by a short style, terminating in an obtuse stigma. The fruit when ripe consists of glossy, scarlet, roundish berries, about the size of a pea, containing six cells and six seeds. Several of these berries are clustered together so as to form little bunches at irregular intervals on the stem. In the latter part of autumn, after the leaves have fallen, they still remain attached to the stem, and render the shrub a striking object in the midst of the general nakedness of vegetation. Hence the plant has received the name of *winter-berry*, by which it is frequently designated.

It grows in all parts of the United States, from Canada to Florida, frequenting low wet places, such as swamps, and the borders of ponds, ditches, and streams. Its flowers appear in June. The berries, which have a bitter, sweetish, somewhat acrid taste, are sometimes used medicinally for the same purposes with the bark, which is the proper officinal portion.

The dried bark is in slender pieces, more or less rolled, brittle, greenish-white internally, and covered with a smooth epidermis which is easily separable, and of a whitish-ash colour, alternating or mingled with brown. It has no smell. The taste is bitter and slightly astringent. Boiling water extracts the virtues of the bark.

Medical Properties and Uses. Black alder is usually considered tonic and astringent; and is among the remedies which have been proposed as substitutes for Peruvian bark, with which, however, it has very little analogy. It has been recommended in intermittent fever, diarrhœa, and other diseases connected with a debilitated state of the system, especially gangrene and mortification. It is a popular remedy in gangrenous or flabby and ill-conditioned ulcers, and in chronic cutaneous eruptions, in which it is given internally, at the same time that it is applied locally in the form of a wash or poultice. Any favourable influence which it may exert over these affections must be ascribed rather to a peculiar alterative property, than to its tonic and astringent powers, which are very feeble.

It may be used in substance or decoction. The dose of the powder is from thirty grains to a drachm, to be repeated several times a day. The decoction, which is usually preferred both for internal and external use, may be prepared by boiling two ounces of the bark with three pints of water to a quart, and given in the dose of two or three fluidounces. A saturated tincture, as well of the berries as of the bark, is sometimes employed.

W.

PRUNUM. *U.S.*

Prunes.

"Prunus domestica. Fructus siccatus. *The dried fruit.*" *U.S.*

Off. Syn. PRUNA. Prunus domestica. Drupæ exsiccatæ. *Lond.;* PRUNI DOMESTICÆ FRUCTUS. Fructus siccatus. *Ed.;* PRUNUS DOMESTICA. Fructus siccatus. *Dub.*

Pruneaux, *Fr.;* Pflaumen, *Germ.;* Pruni, *Ital.;* Ciruelas secas, *Span.*

Prunus. *Sex. Syst.* Icosandria Monogynia.—*Nat. Ord.* Amygdaleæ.

Gen. Ch. *Calyx* five-cleft, inferior. *Petals* five. *Nut of the drupe* with sutures somewhat prominent. *Willd.*

Prunus domestica. Willd. *Sp. Plant.* ii. 995; Woodv. *Med. Bot.* p. 520. t. 187. The cultivated prune or plum tree is so well known as to render a minute description unnecessary. We merely give the specific character. "*Peduncles* subsolitary; *leaves* lanceolate, ovate, convolute; *branches* not spiny." The varieties of the tree produced by cultivation are very numerous. Nearly one hundred are to be found in the British gardens. Though at present growing wild in various parts of Europe, it is thought to have been brought originally from Asia Minor and Syria. It is the dried fruit only that is officinal.

The prunes brought to our market come chiefly from the South of France, the best from the port of Bordeaux. They are derived from the variety of the tree named *Juliana* by Linnæus. The fresh fruit, called *prune de Saint Julien* by the French, is of an oval shape, nearly an inch in length, and of a deep violet colour. It is prepared by drying in the sun after having been exposed to the heat of an oven. The finest prunes, used on the tables in France, are prepared from the larger kinds of plums, such as the *Saint Catharine* and *Reine-Claude* or *green-gage*. An inferior sort is brought from Germany.

Prunes have a feeble odour, and a sweet mucilaginous taste, which is generally also somewhat acid. They contain uncrystallizable sugar, malic acid, and mucilaginous matter. In Germany they obtain from this fruit a kind of brandy, which in some districts is much employed. Bonneberg, a German chemist, has succeeded in extracting crystallizable sugar, equal to that of the cane.

Medical Properties and Uses. Prunes are laxative and nutritious, and stewed with water form an excellent diet in cases of costiveness, especially during convalescence from febrile and inflammatory diseases. As they impart their laxative property to water in which they are boiled, they serve as a pleasant and useful addition to purgative decoctions. Their pulp is also used in the preparation of laxative confections. Too largely taken in a debilitated state of the digestive organs, they are apt to occasion flatulence, and griping pain in the stomach and bowels.

Off. Prep. Confectio Sennæ, *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

PRUNUS LAURO-CERASUS. Folia. *Dub.*

Leaves of Cherry-Laurel.

Laurier cerise, *Fr.*; Kirschlorbeer, *Germ.*; Lauro-ceraso, *Ital.*

Prunus. See PRUNUM.

Prunus Lauro-cerasus. Willd. *Sp. Plant.* ii. 988; Woodv. *Med. Bot.* p. 513. t. 185.—*Cerasus Lauro-cerasus*, De Cand. *Prod.* ii. 540. This is a small evergreen tree, rising fifteen or twenty feet in height, with long spreading branches, which, as well as the trunk, are covered with a smooth blackish bark. The leaves, which stand alternately on short strong footstalks, are oval oblong, from five to seven inches in length, acute, finely toothed, firm, coriaceous, smooth, beautifully green and shining, with oblique nerves, and yellowish glands at the base. The flowers are small, white, strongly odorous, and disposed in simple axillary racemes. The fruit consists of oval drupes, very similar to small black cherries, both in their shape and internal structure.

The cherry-laurel is a native of Asia Minor, but has been introduced into Europe, throughout which it is cultivated, both for medical use and for the beauty of its shining evergreen foliage. Almost all parts of it are more or less impregnated with the odour supposed to indicate the presence of hydrocyanic acid. The leaves only are officinal.

In their recent and entire state they have scarcely any smell, but when bruised they emit the characteristic odour of the plant in a high degree. Their taste is somewhat astringent and strongly bitter, with the peculiar flavour of the peach kernel. By drying they lose their sensible properties and become inert. They contain a peculiar volatile oil and hydrocyanic acid, both of which are separated by distillation with water, which they strongly impregnate with their flavour. The oil resembles that of bitter almonds, for which it is said to be sometimes sold in the shops in Europe, where it is employed to flavour liquors and various culinary preparations; but as it is highly poisonous, dangerous consequences may result from its careless use. It has not been determined how much of its action is dependent on the oil itself, and how much on the hydrocyanic acid which is combined with it. The fresh leaves are occasionally used to flavour milk, cream, &c.; and more safely than the oil; though they also are poisonous when too largely employed.

Medical Properties and Uses. The leaves of the cherry-laurel possess properties similar to those of hydrocyanic acid; and the water distilled from them is much employed in various parts of Europe for the same purposes as that active medicine. But it is deteriorated by age; and therefore, as kept in the shops, must be of variable strength. Hence, while Hufeland directs only twenty drops for a dose every two hours, to be gradually increased to sixty drops, M. Fouquier has administered several ounces without effect. Another source of inequality of strength must be the variable quality of the leaves, according to the time they have been kept after separation from the tree, and probably also to their age and degree of development. It is not, therefore, to be regretted, that the want of the plant in this country has prevented the introduction of the distilled water into our shops.

Off. Prep. Aqua Lauro Cerasi, *Dub.* W.

PRUNUS VIRGINIANA. *U.S.*

Wild-cherry Bark.

"Prunus Virginiana. Cortex. *The bark.*" *U.S.*

Prunus. See PRUNUM.

Prunus Virginiana. Willd. *Sp. Plant.* ii. 985.—*Cerasus Virginiana.* Michaux, *N. Am. Sylv.* ii. 205. The wild-cherry tree is, according to Michaux, one of the largest productions of the American forest. Individuals were seen by that botanist on the banks of the Ohio from eighty to one hundred feet high, with trunks from twelve to fifteen feet in circumference, and undivided to the height of twenty-five or thirty feet. But as usually met with in the Atlantic States, the tree is of much smaller dimensions. In the open fields it is less elevated than in forests, but sends out more numerous branches, which expand into an elegant oval summit. The trunk is regularly shaped, and covered with a rough blackish bark, which detaches itself semi-circularly in thick narrow plates, and by this peculiar character serves as a distinguishing mark of the tree when the foliage is too high for inspection. The leaves are oval oblong, acuminate, unequally serrate, smooth on both sides, of a beautiful brilliant green, and supported alternately upon petioles, which are furnished with from two to four reddish glands. The flowers are small, white, and collected in long erect racemes. They appear in May, and are followed by globular drupes about the size of a pea, and when ripe of a shining blackish-purple colour.

This species of Prunus grows throughout the Union, flourishing most in those parts where the soil is fertile and the climate temperate, and abounding in the Middle Atlantic States, and in those which border on the Ohio. In the neighbourhood of Philadelphia, it affects open situations, growing solitary in the fields and along the fences, and seldom aggregated in woods or groves. It is highly valued by the cabinetmakers for its wood, which is compact, fine-grained, susceptible of polish, and of a light red tint, which deepens with age. The fruit has a sweetish, astringent, bitter taste; and is much employed in some parts of the country to impart flavour to spirituous liquors. The inner bark is the part employed in medicine, and is obtained indiscriminately from all parts of the tree, though that of the roots is most active. It should be preferred recently dried, as it deteriorates by keeping.

Properties. Wild-cherry bark as kept in the shops is in pieces of various sizes, more or less curved laterally, usually destitute of epidermis, of a lively cinnamon colour, brittle, and pulverizable, presenting a reddish-gray fracure, and affording a fawn-coloured powder. In the fresh state, or when boiled in water, it emits an odour resembling that of peach leaves. Its taste s agreeably bitter and aromatic, with the peculiar flavour of the bitter almond. It imparts its sensible properties to water, either cold or hot, producing a clear reddish infusion closely resembling Madeira wine in appearance. Its peculiar flavour is injured by boiling, in consequence of the volatilization of the principle upon which it depends. From a recent analysis by Mr. Proctor, of Philadelphia, it appears to contain volatile oil, hydrocyanic cid, starch, resin, tannin, gallic acid, fatty matter, lignin, red colouring mater, salts of lime and potassa, and iron. The volatile oil may be obtained y distilling the same portion of water successively from several different porons of the bark. It is of a light straw colour, and very analogous in its properties to the volatile oil of bitter almonds. In the quantity of two drops it proved fatal to a cat in less than five minutes. (*Journ. of the Phil. Col. of Pharm.* vi. 8.)

Medical Properties and Uses. This bark is among the most valuable of our indigenous remedies. Uniting with a tonic power, the property of calming irritation and diminishing nervous excitability, it is admirably adapted to the treatment of diseases in which a debilitated condition of the stomach, or of the system at large, is united with general or local irritation. When largely taken it is said to diminish the action of the heart, an effect which is ascribable to the hydrocyanic acid contained in it. Dr. Eberle states that copious draughts of the cold infusion, taken several times a-day, and continued for nearly two weeks, had the effect of reducing his pulse from seventy-five to fifty strokes in the minute. The remedy is highly useful in the hectic fever of scrofula and consumption, in the treatment of which it has long been a favourite with many American practitioners. In the general debility which often succeeds inflammatory diseases, it has also been found advantageous, and i tis well adapted to many cases of dyspepsia. It has been used successfully in intermittent fever, but in this complaint is much inferior to cinchona.

It may be used in powder or infusion. The dose of the powder is from thirty grains to a drachm. The infusion is properly directed by our national Pharmacopœia to be prepared with cold water. (See *Infusum Pruni Virginianæ.*)

Off. Prep. Infusum Pruni Virginianæ, *U.S.* W.

PYRETHRUM. *Dub.*

Pellitory Root.

"Anthemis Pyrethrum. *Radix.*" *Dub.*

Off. Syn. PYRETHRI RADIX. Anthemis Pyrethrum. Radix. *Lond.*; ANTHEMIDIS PYRETHRI RADIX. *Ed.*

Pyrèthre, *Fr.;* Bertram Wurtzel, *Germ.;* Piretro, *Ital.;* Pelitre, *Span.*

Anthemis. See ANTHEMIS.

Anthemis Pyrethrum. Willd. *Sp. Plant.* iii. 2184; Woodv. *Med. Bot.* p. 50. t. 20. The root of this plant is perennial, and sends up numerous stems, which are usually trailing at the base, erect in their upper portion, eight or ten inches high, and terminated by one large flower. The leaves are doubly pinnate, with narrow nearly linear segments of a pale green colour. The florets of the disk are yellow; the rays are white on their upper surface, and reddish or purple beneath and at their edges.

The plant is a native of the Levant, Barbary, and the Mediterranean coast of Europe. The root is the only part used under the name of pellitory. According to Hayne, the pellitory of the shops is derived from the *Anacyclus officinarum*, a plant cultivated in Thuryngia for medical purposes. This remark, however, can apply only to Germany.

Properties. The dried root of the *A. Pyrethrum* is about the size of the little finger, cylindrical, straight or but slightly curved, wrinkled longitudinally, of an ash-brown colour externally, whitish within, hard and brittle, sometimes furnished with a few radicles. It is destitute of odour, though when fresh, of a disagreeable smell. Its taste is peculiar, slight at first, but afterwards acidulous, saline, and acrid, attended with a burning and tingling sensation over the whole mouth and throat, which continues for some time, and excites a copious flow of saliva. Its constituents, according to M. Gauthier, are a fixed oil, a yellow colouring matter, gum, inulin, lignin, with traces of volatile oil and of muriate of lime. The pungency depends on the fixed oil, which, however, is considered by M. Boullay to be more closely allied to the resins than to the principles among which it is placed.

Medical Properties and Uses. Pellitory root is a powerful irritant, used almost exclusively as a sialagogue in certain forms of headach, rheumatic and neuralgic affections of the face, toothach, &c., or as a local stimulant in palsy of the tongue or throat, and in relaxation of the uvula. For these purposes it may be chewed, or employed as a gargle in decoction or vinous tincture. It is seldom prescribed by medical practitioners in this country. W.

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QUASSIA. *U.S.*

Quassia.

"Quassia excelsa. *Willd.;* Simaruba excelsa. *De Candolle.* Lignum. *The Wood.*" *U.S.*

Off. Syn. QUASSIÆ LIGNUM. Quassia excelsa. Lignum. *Lond.;* QUASSIÆ EXCELSÆ LIGNUM. *Ed.;* QUASSIA EXCELSA. Lignum. *Dub.*

Bois de quassie, *Fr.;* Quassienholz, *Germ.;* Legno della quassia, *Ital.;* Leno de quassia, *Span.*

Quassia. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Magnoleæ, *Juss.;* Simarubaceæ, *Richard, Lindley.*

Gen. Ch. Calyx five-leaved. *Petals* five. *Nectary* five-leaved. *Drupes* five, distant, bivalve, one-seeded, inserted into a fleshy receptacle. *Willd.*

Of the species included by Linnæus in this genus, some, as the *Quassia amara*, are hermaphrodite; others, as the *Q. excelsa* and *Q. Simaruba*, are polygamous. The latter have been associated together by De Candolle in a distinct genus, with the title *Simaruba;* and the *Simaruba excelsa* of this author has been recognised, in the United States Pharmacopœia, as a synonyme of the officinal quassia plant.

The medicine was formerly thought to be obtained from the *Quassia amara;* but more than twenty years since, Lamarck stated that in consequence of the scarcity of this tree, the *Quassia excelsa* had been resorted to as a substitute, and the Pharmacopœias at present agree in acknowledging the latter as the officinal plant. It is, however, the opinion of Martius, that the genuine quassia of Surinam is the *Q. amara*; and we shall, therefore, give a brief description of both species.

Quassia excelsa. Willd. *Sp. Plant.* ii. 569.—*Simaruba excelsa*, De Cand. *Ann. du Mus.* xvii. 424; Hayne, *Dartsel. und Beschreib., &c.* ix. 16. As its name imports, this is a lofty tree, attaining sometimes not less than one hundred feet in height, with a straight smooth tapering trunk, which is often three feet in diameter near its base, and covered with a smooth gray bark. The leaves are pinnate, with a naked petiole, and oblong pointed leaflets standing upon short footstalks, in opposite pairs, with a single leaflet at the end. The flowers are small, of a yellowish-green colour, and disposed in panicles. They are polygamous and pentandrous. The fruit is a small black drupe. This species inhabits Jamaica and the Caribbean islands, where it is called *bitter ash.* The wood is the officinal portion.

Quassia amara. Willd. *Sp. Plant.* ii. 567; Woodv. *Med, Bot.* p. 574. t. 04. The bitter quassia is a small branching tree or shrub, with alternate eaves, consisting of two pairs of opposite pinnæ, with an odd one at the end.

The leaflets are elliptical, pointed, sessile, smooth, of a deep green colour on their upper surface, and paler on the under. The common footstalk is articulated, and edged on each side with a leafy membrane. The flowers, which are hermaphrodite and decandrous, have a bright red colour, and terminate the branches in long racemes. The fruit is a two-celled capsule, containing globular seeds. The *Q. amara* is a native of Surinam, and is said also to grow in some of the West India islands. Its root, bark, and wood were formerly officinal. They are all excessively bitter, as are also the leaves, flowers, and fruit, and in fact the whole plant. It is uncertain whether any of the produce of this tree reaches our markets.

Quassia comes in cylindrical billets of various sizes, from an inch to near a foot in diameter, and several feet in length. These are frequently invested with a whitish smooth bark, brittle and but slightly adherent, and possessing in at least an equal degree the virtues of the wood. Their shape and structure clearly evince that they are derived from the branches or trunk, and not, as some suppose, from the root of the tree. In the shops they are usually kept split into small pieces, or rasped.

Properties. The wood is at first whitish, but becomes yellow by exposure. It is inodorous, and has a purely bitter taste, which is surpassed by that of few other substances in intensity and permanence. It imparts all its active properties, with its bitterness and yellow colour, to water and alcohol. The extract obtained by gently evaporating the aqueous infusion, is ranked by Dr. Thomson among the proximate vegetable principles under the name of *quassin.* It is a brownish-yellow substance, to a certain degree transparent, soluble in water and alcohol, and remarkable for the very narrow circle of its chemical affinities. Of all the reagents in common use as medicines, nitrate of silver and acetate of lead alone produce precipitates with its solution. These, therefore, are the only salts incompatible with the infusion of quassia.

Medical Properties and Uses. Quassia has in the highest degree all the properties of the simple bitters. It is purely tonic, invigorating the digestive organs, with little excitement of the circulation, or increase of animal heat. It has not been very long known as a medicine. About the middle of the last century, a negro of Surinam, named Quassi, acquired considerable reputation in the treatment of the malignant fevers of that country, by a secret remedy, which he was induced to disclose to Mr. Rolander, a Swede, for a valuable consideration. Specimens were taken to Stockholm by this gentleman in the year 1756; and the medicine soon became popular in Europe. The name of the negro has been perpetuated in the generic title of the plant. Quassia is useful in all cases in which a simple tonic impression is desirable. It is particularly adapted to dyspepsia from debility of stomach, and to that weakened state of the digestive organs which sometimes succeeds acute disease. It may also be given with advantage in the remission of certain fevers in which tonics are demanded. No one at present would expect from it any peculiar controlling influence over malignant fevers. It is said to be largely consumed in England by the brewers, who employ it to impart bitterness to their liquors.

It is most conveniently administered in infusion. (See *Infusum Quassiæ.*) The watery extract, made by evaporating the decoction is a very convenient preparation, and may be given in the form of pill, in the dose of five grains. The difficulty of reducing the wood to powder, is an objection to its use in substance. It may, however, be employed in a dose varying from a scruple to a drachm, repeated three or four times a day.

Off. Prep. Infusum Quassiæ, *U.S., Lond., Ed., Dub.;* Tinctura Quassiæ, *U.S., Ed., Dub.* W.

QUERCUS ALBA. *U.S.*

White-oak Bark.

"Quercus alba. Cortex. *The bark.*" *U.S.*

QUERCUS TINCTORIA. *U.S.*

Black-oak Bark.

"Quercus tinctoria. Cortex. *The bark.*" *U,S.*

Off. Syn. QUERCUS CORTEX. Quercus pedunculata. Cortex. *Lond.*; QUERCUS ROBORIS CORTEX. *Ed.*; QUERCUS ROBUR. Cortex. *Dub.*

Ecorce de chêne, *Fr.;* Eichenrinde, *Germ.;* Corteccia della quercia, *Ital.;* Corteza de roble, *Span.*

Quercus. *Sex. Syst.* Monœcia Polyandria.—*Nat. Ord.* Amentaceæ, *Juss.;* Cupuliferæ, *Richard, Lindley.*

Gen. Ch. Male. *Calyx* commonly five-cleft. *Corolla* none. *Stamens* five to ten. Female. *Calyx* one-leafed, entire, rough. *Corolla* none. *Styles* two to five. *Nut* coriaceous, surrounded at the base by the persistent calyx. *Willd.*

This extensive genus comprises not less than eighty species, of which between thirty and forty are found within the limits of the United States. Many of these are applied to important practical purposes. In the northern hemisphere the oak is the most valuable, as it is the most widely diffused of all forest trees. Notwithstanding the great number of species, few, comparatively, have found a place in the officinal catalogues. The *Q. robur* or common European oak, and the *Q. pedunculata* or European white oak, are the only species admitted by the British Colleges. As these do not grow in the United States, and their products are not imported, it is unnecessary to treat of them particularly in this work. According to Michaux, they grow in the same countries, frequently together, constituting the greater part of the forests of Europe, and spreading over almost the whole northern section of Asia, and the northern coast of Africa. The *Q. pedunculata* is the common British oak, celebrated as well for its majestic growth and the venerable age which it attains, as for the strength and durability of its timber, and the high purposes to which it has been applied. Our own Pharmacopœia recognises only the *Q. alba* or white oak, and the *Q. tinctoria* or black oak; but several other species afford barks which are equally useful, and perhaps as much employed. Such are the *Q. falcata* or Spanish oak, the *Q. prinus* or white chesnut oak, and the *Q. montana* or rock chesnut oak. The remarks which follow in relation to the white oak bark, will apply also to that of the three last mentioned species. The bark of the *Q. tinctoria* is somewhat peculiar.

1. *Quercus alba.* Willd. *Sp. Plant.* iv. 448; Michaux, *N. Am. Sylv.* i. 17. Of all the American species, the *white oak* approaches nearest in the character of its foliage, and the properties of its wood and bark, to the *Q. pedunculata* of Great Britain. When allowed to expand itself freely in the open field, it divides at a short distance from the ground into numerous widely spreading branches, and attains under favourable circumstances a magnificent size. Its trunk and large branches are covered with a whitish bark, which serves to distinguish it from most of the other species. The

leaves are regularly and obliquely divided into oblong, obtuse, entire lobes, which are often narrowed at their base. When full grown, they are smooth and light green on their upper surface, and glaucous beneath. Some of the dried leaves remain on the tree during the whole winter, and till the circulation of the sap returns in spring. The acorns are large, ovate, contained in rough, shallow, grayish cups, and supported singly or in pairs upon peduncles nearly an inch in length.

The white oak abounds in the Middle States, and extends also through the whole Union, though comparatively rare in the northern, southern, and western sections. It is the most highly valued for its timber of all the American oaks, with the exception of the *live oak* (*Q. virens*), which is preferred in ship-building. The bark is sometimes used for tanning, but that of the *red* and *Spanish oaks* is preferred for this purpose. All parts of the tree, with the exception of the epidermis, are more or less astringent; but this property predominates in the fruit and the bark, the latter of which is the only officinal portion.

Oak bark, deprived of its epidermis, is of a light brown colour, of a coarse fibrous texture, and not easily pulverized. It has a feeble odour, and a rough, astringent, and bitterish taste. Water and alcohol extract its active properties. The chief soluble ingredients are tannin, gallic acid, and extractive matter. It is upon the tannin that its medical virtues as well as its use in the preparation of leather chiefly depend. The proportion of this ingredient varies with the size and age of the tree, the part from which the bark is derived, and even the season when it is gathered. It is most abundant in the young bark; and the English oak is said to yield four times as much in spring as in the winter. Sir H. Davy found the inner bark most abundant in tannin, the middle portion or cellular integument much less so, and the epidermis almost wholly destitute as well of this principle as of extractive. Vauquelin states that the infusion of oak bark does not, like that of galls, precipitate tartar emetic.

2. *Quercus tinctoria*. Willd. *Sp. Plant.* iv. 444; Michaux, *N. Am. Sylv.* i. 91. The *black oak* is one of our largest trees, frequently attaining the height of eighty or ninety feet. Its trunk is covered with a deeply furrowed bark, of a black or dark brown colour. The leaves are ovate oblong, pubescent, slightly sinuated, with oblong, obtuse, mucronate lobes. The fructification is biennial. The acorn is globose, flattened at top, and placed in a saucer-shaped cup.

Black oak bark has a more bitter taste than that of the other species, and may be distinguished also by staining the saliva yellow when it is chewed. Its cellular integument contains a colouring principle, capable of being extracted by boiling water, to which it imparts a brownish-yellow colour, which is deepened by alkalies, and rendered brighter by acids. Under the name of *quercitron*, large quantities of this bark, deprived of its epidermis and reduced to coarse powder, are sent from the United States to Europe, where it is used for dyeing wool and silk of a yellow colour. It contains also much tannin; but is less used in tanning than the other barks, in consequence of the colour which it imparts to the leather.

Medical Properties and Uses. Oak bark is astringent and somewhat tonic. It has been given with advantage in intermittent fever, obstinate chronic diarrhœa, and certain forms of passive hemorrhage; but it is not much employed as an internal remedy. Externally applied it is often productive of benefit. The decoction may be advantageously used as a bath, particularly for children, when a combined tonic and astringent effect is desirable, and the stomach is not disposed to receive medicines kindly. It has been employed in this way in marasmus, scrofula, intermittent fevers, chronic diarrhœa, and cholera infantum. As an injection in leucorrhœa, a wash in prolapsus ani and hemorrhoidal affections, and as a gargle in slight inflammation of the fauces, attended with prolapsed uvula, the decoction is often highly useful. Reduced to powder and made into a poultice, the bark was recommended by the late Dr. Barton as an excellent application in cases of external gangrene and mortification; and the infusion obtained from tanners' vats has been used beneficially as a wash in flabby, ill-conditioned ulcers.

The bark may be given internally in the form of powder, extract, or decoction. The dose of the powder is from thirty grains to a drachm, of the extract about half as much, of the decoction two fluidounces. (See *Decoctum Quercûs.*)

Black-oak bark is considered inferior to the white-oak as an internal remedy, in consequence of being more disposed to irritate the bowels.

The fruit of the oak is sometimes used as an astringent; and a decoction made from roasted acorns has been highly recommended by Hufeland as a remedy in scrofula.

Off. Prep. Decoctum Quercûs, *Lond.*, *Dub.;* Extractum Quercûs, *Dub.*

W.

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RANUNCULUS. *U.S. Secondary.*

Crowfoot.

"Ranunculus bulbosus. Planta. *The plant.*" *U.S.*

Off. Syn. RANUNCULUS ACRIS. Folia. RANUNCULUS FLAMMULA. Herba recens. *Dub.*

Ranunculus. *Sex. Syst.* Polyandria Polygynia.—*Nat. Ord.* Ranunculaceæ.

Gen. Ch. Calyx five-leaved. *Petals* five, having the inner side of each claw furnished with a melliferous pore. *Seeds* naked, numerous. *Nuttall.*

Most of the plants belonging to this genus have the same acrid properties. Several of them grow together in our fields and pastures, and from their close resemblance in appearance, are confounded under the common name of *buttercup*, applied to them from the colour and shape of their flowers. Those which are most abundant are believed to have been introduced from Europe. Such are the *R. bulbosus*, *R. acris*, and *R. repens*, which, with the *R. sceleratus*, may be indiscriminately used. In Europe, the *R. sceleratus* appears to have attracted most attention; in this country, the *R. bulbosus*. The latter is the only one designated by our Pharmacopœia. The *R. acris* and *R. flammula* are directed by the Dublin College.

Ranunculus bulbosus. Willd. *Sp. Plant.* ii. 1324; Bigelow, *Am. Med. Bot.* iii. 61. This species of crowfoot is perennial, with a bulbous, solid, fleshy root, which sends up annually several erect, round, and branching stems, from nine to eighteen inches high. The radical leaves, which stand on long footstalks, are ternate or quinate, with lobed and dentate leaflets. The leaves of the stem are sessile and ternate, the upper more simple. Each stem supports several solitary, bright yellow, glossy flowers, upon furrowed, angular peduncles. The leaves of the calyx are reflexed or bent downwards against the flowerstalk. The petals are obcordate and arranged so as to represent a small cup in shape. At the inside of the claw of each petal is a small cavity, which is covered with a minute wedge-shaped emarginate scale. The fruit consists of numerous naked seeds, collected in a spherical head. The stem, leaves, peduncles, and calyx are hairy.

In the months of May and June our pastures are everywhere adorned with the rich yellow flowers of this species of Ranunculus. Somewhat later the *R. acris* and *R. repens* begin to bloom, and a succession of similar flowers is maintained till September. The two latter species prefer a moister ground, and are found most abundantly in meadows. The *R. sceleratus* is found in ponds and ditches. In all these species, the whole plant is pervaded by a volatile acrid principle, which is dissipated by drying or by the application of heat. This principle may be separated by distillation. Dr. Bigelow found that water distilled from the fresh plant has an acrid taste, and produces when swallowed a burning sensation in the stomach; and that it retains these properties for a long time if kept in closely stopped bottles. The plant itself when chewed excites violent irritation in the mouth and throat; inflaming and even excoriating the tongue and inside of the cheeks and lips, if not quickly discharged. Both the root and herbaceous portion of the *R. bulbosus* are officinal.

Medical Properties and Uses. Crowfoot, when swallowed in the fresh state, produces heat and pain in the stomach, and if the quantity be considerable, may excite fatal inflammation. It is, however, never used internally. The property for which it has attracted the attention of physicians is that of inflaming and vesicating the skin; and before the introduction of the Spanish fly into use, it was much employed for this purpose. But the uncertainty and occasional violence of its action have nearly banished it from regular practice. While on some individuals it appears to produce scarcely any effect, on others it acts very speedily, exciting extensive and troublesome inflammation, which sometimes terminates in deep and obstinate ulcers. It probably varies in strength with the season, and in the dried state, or boiled with water it is wholly inert. The decoction, moreover, is inert, in consequence of the escape of the acrid principle. Nevertheless, the plant has been very properly retained by the Pharmacopœia in the catalogue of medicines of secondary importance; as occasions may occur when the practitioner in the country may find advantage in having recourse to its powerful rubefacient and epispastic operation. W.

RESINA. *U.S.*

Resin.

"Pinus palustris, et aliæ. Residuum postquam oleum terebinthinæ destillatum est. *The residuum after the distillation of the oil of turpentine.*" *U.S.*

Off. Syn. RESINA FLAVA. Pinus sylvestris. *Lond.*; PINI RESINA SOLIDA, oleo volatile privata, *vulgo*, RESINA ALBA. *Ed.*; PINUS SYLVESTRIS. Resina. *Dub.*

Resine blanche, Resine jaune, *Fr.;* Fichtenharz, *Germ.;* Ragea di pino, *Ital.;* Resina de pino, *Span.*

After the distillation of the volatile oil from the turpentines, (see *Terebinthina,*) a resinous matter remains, which on the continent of Europe is called *colophony*, but in our language is commonly known by the name of *rosin.* It is the Resina of the United States Pharmacopœia, and the Resina flava or *yellow resin*, of the London and Dublin Colleges. When this, in a state of fusion, is strongly agitated with water, it acquires a distinct appearance, and is now denominated Resina alba or *white resin.* Before describing these officinal substances, it may be proper to enumerate the characteristic properties of the proximate principles which chemists designate by the term resins.

Pure resins are solid, brittle, inodorous, insipid, generally of a yellowish colour and semitransparent, with a smooth and shining fracture. Their sp. gr. varies from 0.92 to 1.2. They are fusible by a moderate heat, decomposed at a higher temperature, and in the open air take fire, burning with a yellow flame and much smoke. Insoluble in water, they are dissolved by alcohol, ether, and the essential oils; and their alcoholic and ethereal solutions afford precipitates upon the addition of water. With pure potassa and soda they unite to form soaps which are soluble in water; and the same result takes place when they are heated with the solutions of the alkaline carbonates. Concentrated sulphuric acid dissolves them with mutual decomposition; and nitric acid converts them into artificial tannin. They readily unite by fusion with wax and the fixed oils.

Common or *yellow resin*, in its purest state, is beautifully clear and pellucid, but much less so as it is commonly found in the shops. Its odour and taste are usually in a slight degree terebinthinate; its colour yellowish-brown with a tinge of olive, and more or less dark according to its purity. It is rather heavier than water. At 276° F. it fuses, is completely liquid at 306°, begins to emit bubbles of gas at 316°, and is entirely decomposed at a red heat. Its constituents are carbon, oxygen, and hydrogen; but the exact proportions are differently stated by different chemists.

White resin differs from the preceding only in being opaque and of a whitish colour. These properties it owes to the water with which it is incorporated, and which gradually escapes upon exposure, leaving it more or less transparent.

Medical Uses. Resin is important as an ingredient of ointments and plasters; but is never used internally.

Off. Prep. Ceratum Cantharidis, *U.S.*, *Ed.*, *Dub.;* Ceratum Resinæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Emplastrum Ceræ, *Lond.*, *Ed.;* Emplast. Ferri, *U.S. Ed.;* Emplast. Hydrargyri, *U.S.*, *Ed.;* Emplast. Resinæ, *U.S*, *Lond.*, *Ed.*, *Dub.;* Unguentum Cantharidis, *Ed.* W.

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RHAMNI BACCÆ. *Lond.*

Buckthorn Berries.

"Rhamnus catharticus. *Baccæ.*" *Lond.*

Off. Syn. RHAMNI CATHARTICI SUCCUS. Ex baccis. *Ed.;* RHAMNUS CATHARTICUS. Baccæ. *Dub.*

Baies du nerprun, *Fr.;* Kreutzbeeren, *Germ.;* Bacche del spino cervino, *Ital.;* Bayas e ramno catartico, *Span.*

Rhamnus. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Rhamneæ.

Gen. Ch. Calyx tubular. *Corolla* scales defending the stamens, inserted nto the calyx. *Berry. Willd.*

Rhamnus catharticus. Willd. *Sp. Plant.* i. 1092; Woodv. *Med. Bot.* p. 594. t. 210. The purging buckthorn is a shrub seven or eight feet high, with branches terminating in a sharp spine. The leaves are in fascicles, on hort footstalks, ovate, serrate, veined. The flowers are usually diœcious, in clusters, small, greenish, peduncled, with a four-cleft calyx, and four very small scale-like petals, placed, in the male flower, behind the stamens, which equal them in number. The fruit is a four-seeded berry.

The shrub is a native of Europe, and is said to have been found growing wild in this country. It was first discovered in the Highlands of New York by Dr. Barratt. (*Eaton's Manual.*) It flowers in May and June, and ripens its fruit in the latter part of September. The berries are the officinal portion. When ripe they are about the size of a pea, round, somewhat flattened on the summit, black, smooth, shining, with four seeds surrounded by a green, juicy parenchyma. Their odour is unpleasant, their taste bitterish, acrid, and nauseous. The expressed juice has the colour, odour, and taste of the parenchyma. It is reddened by the acids, and from deep green is rendered light green by the alkalies. Upon standing it soon begins to ferment, and becomes red in consequence of the formation of acetic acid. Evaporated to dryness with the addition of lime or an alkali, it forms the colour called by painters *sap-green*. The dried berries of another species, *R. infectorius*, yield a rich yellow colour, for which they are much employed in the arts under the name of *French berries.*

Medical Properties and Uses. Both the berries and the expressed juice are actively purgative; but, as they are apt to occasion nausea, and severe griping pain in the bowels, with much thirst and dryness of the mouth and throat, they are now little employed. They formerly enjoyed considerable reputation as a hydragogue cathartic in dropsy; and were given also in rheumatism and gout. The only shape in which they are used in this country is that of the syrup, which is sometimes, though rarely, added to hydragogue or diuretic mixtures. (See *Syrupus Rhamni.*)

The dose of the recent berries is about a scruple, of the dried berries a drachm, and of the expressed juice a fluidounce.

Off. Prep. Syrupus Rhamni, *Lond.*, *Dub.* W.

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RHEUM. *U.S.*

Rhubarb.

"Rheum palmatum, et alia. Radix. *The root.*" *U.S.*

Off. Syn. RHEI RADIX. Rheum palmatum. Radix. *Lond.*; RHEI RADIX. *Ed.*; RHEUM PALMATUM et RHEUM UNDULATUM. Radix. *Dub.*

Rhubarbe, *Fr.*; Rhabarber, *Germ.*; Rabarbaro, *Ital.*; Ruibarbo, *Span.*; Hai-houng, *Chinese*; Schara-modo, *Tibet.*

RHEUM. *Sex. Syst.* Enneandria Trigynia.—*Nat. Ord.* Polygoneæ.

Gen. Ch. Calyx none. *Corolla* six-cleft, persistent. *Seed* one, three-sided. *Willd.*

Notwithstanding the length of time that rhubarb has been in use, and the attention which it has received from naturalists, the question yet remains unsettled from what precise plant it is derived. The remoteness of the region where it is collected, and the jealous care with which the monopoly of the trade in this drug is guarded, have prevented any accurate information on the subject. All that we certainly know, is that it is the root of one or more species of Rheum. It is true that the Pharmacopœias undertake to designate the particular species. Thus, the London College recognises the *R. palmatum*, the Dublin both this and the *R. undulatum*, and in the United

States Pharmacopœia the drug is referred to the *R. palmatum* and other species not particularized. But the evidence in favour of either of these species is by no means unequivocal, as will appear from the following brief history.

The *rhabarbarum* of the ancients, from which the modern name *rhubarb* was derived, is supposed to have been the root of the *Rheum Rhaponticum*, which grows on the banks of the Caspian sea and the Wolga; and this species was formerly believed to be the source of the medicine now in use. But the true rhubarb has long been known to be wholly distinct from the Rhapontic, and derived from a different source. It was not till the year 1732 that any probable information was obtained as to its real origin. At that time plants were received from Russia by Jussieu in France and Rand in England, which were said to be of the species which afforded the genuine rhubarb, and were named by Linnæus, under this impression, *Rheum Rhabarbarum*, a title which has since given way to *Rheum undulatum*. At a subsequent period, Kauw Boerhaave obtained from a merchant who dealt in the rhubarb of Tartary, some seeds which he said were those of the plant which produced the root he sold. These seeds having been planted, yielded two species of Rheum, the *R. undulatum*, and another which Linnæus pronounced to be distinct, and named *R. palmatum*. Seeds transmitted by Dr. Mounsey from St. Petersburg to Dr. Hope, and planted in the botanic garden at Edinburgh, produced the latter species; and the same was also raised at Upsal from a root received by Linnæus from De Gorter, and was described A. D. 1767 by the younger Linnæus, two years after the appearance of Dr. Hope's paper in the Philosophical Transactions. Thus far the evidence appears equally in favour of the *R. palmatum* and *R. undulatum*. The claims of another species were afterwards presented. Pallas, upon exhibiting the leaves of the *R. palmatum* to some Bucharian merchants, of whom he was making inquiries relative to the rhubarb plant, was told that the leaves of the latter were entirely different in shape; and the description he received of them corresponded more closely with those of the *R. compactum*, than of any other known species. Seeds of this plant were moreover sent to Miller from St. Petersburg, as those of the true Tartarian rhubarb. Within a few years the attention of naturalists has been called to a fourth species, for which the same honour is claimed. Dr. Wallich, superintendent of the botanical garden at Calcutta, received seeds which were said to be those of the plant which yielded the Chinese rhubarb, growing on the Himalaya mountains and the highlands of Tartary. These produced a species not hitherto described, which Dr. Wallich named *R. Emodi*, from the native title of the plant. It is the *R. australe* of Mr. Don and of Colebrooke. From what has been said, it is obvious that no species yet mentioned can be considered as the undoubted source of commercial rhubarb, the plant having, in no instance, been seen and examined by naturalists in its native place. Sievers, an apothecary sent to Siberia in the reign of Catharine II. with the view of improving the cultivation of the native rhubarb, asserts, from information given him by the Bucharians, that all the seeds procured under the name of true rhubarb are false, and pronounces "all the descriptions in all the Materia Medicas to be incorrect." This assertion, however, has no relation to the *R. australe* which has been subsequently described; but of this plant it is said that the roots dried by the medical officers of the British army in India differ from true rhubarb in appearance and power. Stlll, however, it is possible that the medicine is derived from one or more, or even from all the species alluded to, and if it should be objected that their roots, as cultivated in Europe, have not the precise qualities or composition of the Asiatic rhubarb, the answer is obvious, that the product of the same plant is often known to vary exceedingly with diversities of soil, climate, and culture.

All the plants of this genus are perennial and herbaceous, with large branching roots, which send forth vigorous stems from four to eight feet or more in height, surrounded at their base with numerons very large petiolate leaves, and terminating in lengthened branching panicles composed of small and very numerous flowers, resembling those of the Rumex or dock. Without describing the several species minutely, we shall mention those particulars with regard to them by which they are respectively characterized.

Rheum palmatum. Willd. *Sp. Plant.* ii. 489; Woodv. *Med. Bot.* p. 662. t. 231. The root of this species is large, divided into thick branches, brittle, externally brown, internally of a deep yellow colour. The leaves are palmate, with five or seven deeply sinuated pointed segments, are somewhat rough, and stand on long smooth footstalks, which are somewhat channeled on their upper surface, and rounded on the sides. It is said to inhabit China, in the vicinity of the great wall.

R. undulatum. Willd. *Sp. Plant.* ii. 489; Loudon's *Encyc. of Plants,* p. 335. The root of the *R. undulatum* is large, roundish, externally brown, internally yellow, and divided into numerous ramifications which penetrate deeply into the soil. The leaves are long, pointed, wavy, and somewhat villous, have at their base on each side a deep sinus, and are supported upon footstalks flat on their upper surface, with acute edges. This species is a native of Siberia, and probably also of Tartary.

R. compactum. Willd. *Sp. Plant.* ii. 489; Loudon's *Encyc. of Plants.* p. 336. This is distinguished by the leaves being very smooth, shining, somewhat lobed, very obtuse, and finely denticulate. The root is thick, divided into many long branches, and internally of a fine reddish-yellow colour. The plant is said to be a native of Tartary and China.

R. australe. Don, *Prod. Flor. Nepal.* p. 75; Sprengel, *Syst. Veg.* iv. 156. "The leaves of this species are roundish cordate, obtuse, rough beneath and on the margin, with the sinus at the base dilated, and with furrowed roundish footstalks. The branches and peduncles are papillose-scabrous; the leaflets of the perianth oval oblong, finely crenate at the apex." The plant grows in the highlands of Chinese Tartary and in the Himalaya mountains.

R. Rhaponticum. Willd, *Sp. Plant.* ii. 488; Loudon's *Encyc. of Plants,* p. 335. The leaves are very large, cordate, obtuse, smooth, with the veins on the under surface hairy, the sinus at the base dilated, and the footstalks furrowed above and rounded at the edge. The root is large, fleshy, often branching, of a yellow colour diversified with red internally, and reddish-brown on the outside. The Rhapontic rhubarb grows on the banks of the Caspian sea, in the deserts between the Wolga and the Oural, and on the mountains of Krasnojar in Siberia.

The leafstalks of the different species of Rheum have a pleasant acid taste, and are used for making tarts and pies, which are not unlike those made with gooseberries. It is for this purpose only that the plants are cultivated in the United States. The *R. Rhaponticum* is the common pie-rhubarb. The *R. palmatum* and *R. undulatum* are sometimes found in our gardens.

In relation to the culture and preparation of rhubarb, our information is almost as uncertain as on the subject of its natural history. The accounts received from the Bucharian merchants are very discordant, and few intelligent travellers have penetrated into the country where the medicine is collected. We shall present, however, a brief abstract of what we have been able to collect upon the subject from the authorities we have consulted.

Rhubarb is produced abundantly in the elevated lands of Tartary about the lake Koko Norr, and is said to be cultivated in the neighbouring Chinese province of Shen-see. From these sources it is generally supposed that our supplies of Russian and Chinese rhubarb are exclusively derived; but the root is also collected in Boutan and Thibet, on the north of the Himalaya mountains; and it is probable that the plant pervades the whole of Chinese Tartary. It flourishes best in a light sandy soil. We are told by Mr. Bell, who, on a journey from St. Petersburg to Pekin, had an opportunity of observing it in a growing state, that it is not cultivated by the Tartars, but springs up spontaneously in tufts at uncertain distances, wherever the seeds have fallen upon the heaps of loose earth thrown up by the marmots. In other places the thickness of the grass prevents their access to the soil. The root is not considered sufficiently mature for collection till it has attained the age of six years. It is dug up twice a year in Tartary, in the spring and autumn; in China not till the winter. After removal from the ground it is cleaned, deprived of its cortical portion and of the smaller branches, and then divided into pieces of a convenient size. These are bored with holes, and strung upon cords to dry, according to Mr. Bell, about the tents and on the horns of the sheep, according to Sievers, under sheds, by which the rays of the sun are excluded, while the air has free access. The Chinese are said first to place the pieces on a stone slab heated by fire beneath, and afterwards to complete the drying process by exposing them to the sun and air. In Boutan, the roots are hung up in a kind of drying room, in which a moderate and regular heat is maintained. Much time and attention are devoted to the preparation of the root; and Sievers states, that a year sometimes elapses from the period of its collection before it is ready for exportation. A very large proportion of its weight is lost in drying, according to some accounts four-fifths, to others not less than seven-eighths. It is probably in order to favour the drying that the bark is removed. The trade in rhubarb centres in the Chinese town of Si-nin, where a Bucharian company or family is established, which possesses a monopoly of this trade, in consideration of a certain tribute paid to the government. To this city the rhubarb is brought from the various places of its collection, and having been duly assorted and undergone further preparation, is transmitted partly to Russia, partly to the coast of China; so that the drug which reaches us through St. Petersburg, is procured from the same neighbourhood with that imported from Canton. But it will soon be seen that there are differences between the Russian and Chinese rhubarb, which would seem to indicate a different origin, and might authorize doubts as to the entire accuracy of the above accounts. Besides the two commercial varieties just mentioned, a third occasionally comes to us from Europe, where the cultivation of rhubarb has been carried on for some time with success, especially in France, Belgium, and Great Britain. Of these three varieties we shall treat under different heads, and shall add a brief account of the Rhapontic, which is entirely distinct from the others.

1. *Chinese Rhubarb.*

RHEUM SINENSE *vel* INDICUM. *Ed.*

Much the largest proportion of rhubarb consumed in this country is brought from Canton. Though somewhat inferior to the Russian, its comparative cheapness gives it a decided preference in our markets; and when of good quality it does not disappoint the expectations of physicians.

It is in cylindrical or roundish pieces, sometimes flattened on one or both sides, of a dirty yellow colour externally, appearing as if the cortical portion of the root had been removed by scraping, and the surface rendered smooth and somewhat powdery by attrition. It is heavier than the Russian rhubarb, has a texture rather close and compact, and when broken presents a ragged uneven surface, variegated with intermingled shades of red, yellow, and white, which are sometimes diversified or interrupted by darker colours. The pieces are generally perforated with small holes, intended for convenience of suspension during the drying process; and portions of the suspending cord are not unfrequently found remaining in the holes.* Chinese rhubarb has a peculiar somewhat aromatic smell, and a bitter astringent taste, feels gritty when chewed, imparts a yellow colour to the saliva, and affords a yellowish powder with a tinge of orange. With the pieces of good quality others often come mingled, which are defective from decay or improper preparation. These are usually lighter, and of a dark or russet colour. Like all the other varieties of rhubarb, this is liable to be attacked by worms; and in almost every large parcel, pieces may be found which have suffered from this cause. The want of proper care in its selection by the Chinese merchants, and the exposure incident to a long sea-voyage, are causes which contribute to its inferiority to the following variety.

2. *Russian Rhubarb.*

RHEUM RUSSICUM *vel* TURCICUM. *Ed.*

The rhubarb taken to Russia from Tartary, undergoes a peculiar preparation in conformity with the stipulations of a contract with the Bucharian merchants who furnish the supply. The best is selected, and each piece perforated in order to ascertain whether it is sound in the centre. From Si-nin it is conveyed by the Bucharian merchants to the frontier town of Kiachta, where it undergoes a rigid inspection by an apothecary stationed at that place by the Russian government. All those pieces which do not pass examination are committed to the flames; and the remainder is sent to St. Petersburg. This variety is sometimes called Turkey rhubarb, from the circumstance that it was formerly derived from the Turkish ports, whither it is said to have been brought from Tartary by caravans through Persia and Natolia. The circumstance of the identity of the Russian and Turkey rhubarb, and their decided difference from the Chinese, would appear to indicate a distinct origin for the two varieties.

The pieces of Russian rhubarb are irregular, and somewhat angular, appearing as if the bark had been shaved off longitudinally by successive strokes of a knife, and a portion of the interior substance removed with each shaving. They have a cleaner and fresher appearance than the Chinese, and their colour both internally and externally, though of the same general character, is somewhat more lively. They are less compact and heavy; and are cut with less facility, owing to their giving way before the knife. Another distinction is in the character of the perforations, which in the Russian rhubarb are large, frequently reaching only to the centre, and evidently made for the purpose of inspection, while in the Chinese they are small, penetrate completely through the pieces, and were intended for the passage of a suspending cord. The taste and smell of the former closely resemble those of the latter, except that the Russian is rather more aromatic. There is the same crackling under the teeth, and the same yellow stain imparted to the saliva; but the colour of the powder in this variety is a bright yellow, without the orange tinge exhibited by the Chinese.

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* Thomson and Duncan state in their respective Dispensatories, that the pieces of Chinese rhubarb are seldom perforated. We have examined many specimens, and find, as regards the drug imported into this country, that their statement is incorrect.

The care which renders the Russian rhubarb so free from defects, tends greatly to enhance its price, and consequently to limit its consumption. Its great comparative value in the market has led to frequent attempts at adulterations; and the pieces of Chinese rhubarb are said to be sometimes cut down and prepared, so as to resemble the Russian. The fraud, however, may be detected by adverting to the peculiarities in texture, colour, and weight, by which the varieties are distinguished. Sometimes the worm-eaten pieces are made to resemble the sound, by filling up the holes with a mixture of pulverized rhubarb and mucilage, and covering over the surface with the powder. By removing this the fraud is at once revealed.

3. *European Rhubarb.*

Rheum Britannicum. *Ed.*

In various parts of Europe, particularly in England, France, Belgium, and Germany, the rhubarb plant has been cultivated for many years; and considerable quantities of the root are annually brought into the market. The *R. palmatum* was first introduced, is most largely cultivated, and is said by M. Guibourt to afford a root, which, when of sufficient age, approaches most nearly, in sensible and chemical qualities, to the rhubarb from China. The *R. undulatum*, and *R. compactum*, are also cultivated. The following account of an establishment for the culture of these plants may prove interesting to those who may be disposed to attempt its introduction into the United States. This establishment is in the department of the Morbihan in France, and is conducted by M. Genthon, a pharmaceutist of Lorient. The quantity of rhubarb which it annually furnishes is fifteen hundred pounds. The mode of proceeding is essentially the same with that formerly pointed out by Baumé. The seeds of the several officinal species are sown in the spring in a light soil. The young shoots are transplanted in the following spring, and placed regularly at the distance of three feet from each other. The roots are not dug up till the autumn of the fifth or sixth year, when they weigh from fifteen to twenty-five pounds. In the fresh state they are more spongy than fibrous, and very difficult to dry, in consequence of the great quantity of mucilaginous and extractive matter they contain. They are first washed in water, and having been deprived of their small branches and radical fibres, are again steeped in fresh water, and cut into pieces of convenient size. The brown bark is then scraped off, and the pieces, having been soaked for three or four hours in cold water, are placed upon bundles of rods to drain, when a gummy, gelatinous matter exudes. The drying is effected in drying rooms heated to 120° or 140° of the centigrade thermometer. The rhubarb by this process loses from seventy to seventy-two per cent. of its weight, and becomes wrinkled on the surface. It is deprived of the wrinkles by grating, and is then introduced into a barrel which is made to revolve upon its axis for half an hour. The pieces are thus covered with a yellow powder arising from their friction against each other; and are made to present an appearance similar to that of the Chinese rhubarb.

Whether from the difference in species, or from the influence of soil and climate, none of the European rhubarb is equal in purgative power to that brought from Russia and China. It is usually in pieces longer than they are thick, sometimes flat, sometimes irregularly cylindrical, and in the latter case often little more than an inch in diameter. Its texture is more ligneous than that of the Asiatic varieties, its colours more compactly arranged, and its powder more strongly tinged with red. It has a nauseous odour and astringent taste, scarcely feels gritty when chewed, and but slightly colours the saliva. Duncan says that the British rhubarb is commonly pasty under the pestle. This quality is probably attributable to imperfect drying. The roots of the different species are not distinguished in commerce.

4. *Rhapontic Rhubarb.*

In the French works on pharmacy, two kinds of rhubarb are described under the name of Rhapontic, both derived from the *R. Rhaponticum*, but one the growth of France, the other of the native country of this species of Rheum. The former is in pieces of the size of the fist, ligneous in their appearance, of a reddish-gray colour on the outside, internally marbled with red and white arranged in the form of rays proceeding from the centre to the circumference, of a disagreeable odour, a mucilaginous and very astringent taste, not crackling under the teeth, but tinging the saliva yellow, and affording a reddish powder. The pieces of the latter are three or four inches long by two or three in thickness, and present characters very similar to those of the French, though less ligneous in their texture, and externally of a pale or brownish-yellow colour less inclining to redness. The Rhapontic rhubarb, though formerly in great repute, is little used at present, and seldom brought to this country; but as it is said to be sometimes employed in Europe to adulterate the better kinds, it may possibly be applied to the same purposes here; and our apothecaries should be able to distinguish it.

Choice of Rhubarb. In selecting good rhubarb, without reference to the commercial variety, those pieces should be preferred which are moderately heavy and compact, of a lively yellowish colour, brittle, presenting when broken a fresh appearance, with reddish and yellow veins intermingled with white, of an odour decidedly aromatic, of a bitter and astringent not mucilaginous taste, feeling gritty and staining the saliva yellow when chewed, and affording a powder either bright yellow, or yellow mingled with orange. When very light, rhubarb is usually rotten or worm-eaten; when very heavy and compact, it is of inferior species, culture, or preparation.

Chemical Properties. Rhubarb yields all its active properties to water and alcohol. The infusion is of a dark reddish-yellow colour, with the taste and odour of rhubarb; and the residue, after sufficient maceration, is whitish, inodorous, and insipid. By boiling, the virtues of the medicine are diminished, in consequence probably of the evaporation of a volatile ingredient in which they partly reside. Many attempts have been made to analyze this important root, with various results. Among the most recen are those of the elder Henry and Caventou of Paris, Brande of London, and Peretti of Rome. From the analysis of M. Henry, it appears that rhubarb contains, 1. a peculiar yellow colouring matter; 2. a fixed oil which become rancid by heat, and is soluble in alcohol and ether; 3. starch; 4. gum; 5. tan nin; 6. lignin; 7. oxalate of lime; 8. supermalate of lime, sulphate of lime, salt of potassa, and oxide of iron, all in minute proportion. To these Pe retti adds sugar, a volatile oil, and gallic acid. Brande found gum, resin extractive, tannin, gallic acid, phosphate and malate of lime, lignin, an water. The extractive of Brande is probably a mixture of other principles among which is the yellow colouring matter of Henry. This last appear to be the most interesting ingredient. It is yellow, of the odour of rhubarb, of a bitter harsh taste, but slightly soluble in cold water, volatilizable by heat in yellow odorous vapours, dissolved and reddened by solutions of potassa and ammonia, precipitated yellow by acids and metallic salts generally, but green by the sulphate of iron, and converted by the action of nitric acid into artificial tannin. The name of *caphopicrite* has been proposed for it. It undoubtedly either contains, or is identical with the yellow matter obtained by Caventou, to which he has given the appropriate name of *rhabarbarin*, and which may be considered the distinctive principle of rhubarb in a pure state. *Rhabarbarin*, as procured by this chemist, is crystallizable; of a yellow colour, harsh bitter taste, and the odour of rhubarb; insoluble in cold water; soluble in hot water, alcohol and ether; and capable of forming insoluble compounds with all the acids. It does not, however, possess alkaline properties. It is probably the purgative principle of rhubarb. The oxalate of lime is another interesting ingredient, though possessed of no medicinal power. It is the substance which imparts the gritty feel to the Russian and Chinese rhubarb, of which, according to Scheele and Henry, it constitutes nearly one-third. The proportion, however, appears to be very variable, as Schrader found only 4.5 per cent. in Russian rhubarb; and Brande discovered none in the specimens which he examined. The European rhubarb contains but a small proportion of the oxalate, and has therefore little of the gritty feel when chewed. It contains, however, much more tannin and fecula than the Asiatic varieties. The existence of volatile oil in rhubarb, though highly probable, has not been satisfactorily demonstrated; at least it has not been obtained separate in a state of purity. The *rheumic* acid has proved to be the oxalic; and the sulphate of rhabarbarin of M. Nani, to be sulphate of lime coloured with extractive matter.

As all the active principles of rhubarb are extracted by alcohol and water, it is desirable to know the proportion of soluble matter in the different varieties. Chinese rhubarb is said to yield 70 parts out of 100 to these fluids; the European, from the *R. palmatum* 64 parts, from the *R. compactum* 50 parts, from the *R. undulatum* 32 parts, and from the *R. rhaponticum* 30 parts. (*Dict. des Drogues.*) Water at 212° takes up 40 per cent, of the Russian, and one-half of the Chinese; alcohol extracts 27 per cent. of the former, and 40 of the latter. (*London Dispensatory.*)

Medical Properties and Uses. The medical properties of rhubarb are peculiar and valuable. Its most remarkable singularity is the union of a cathartic with an astringent power; the latter of which, however, does not interfere with the former, as the purgative effect precedes the astringent. It is also tonic and stomachic; invigorating in small doses, the powers of digestion. It is not probable that these properties reside in a single proximate principle; and, as rhubarb owes its chief value to their combination, it is not to be expected that chemical analysis will be productive of the same practical advantages in this, as in some other medicines, the virtues of which are concentrated in one ingredient. In its purgative operation rhubarb is moderate, producing fecal rather than watery discharges, and appearing to affect the muscular fibre more than the secretory vessels. It sometimes occasions griping pain in the bowels. Its colouring principle is absorbed, and may be detected in the urine.

The circumstances of disease to which it is applicable may be inferred from its peculiar properties. When the stomach is enfeebled and the bowels relaxed, at the same time that a gentle cathartic is required, rhubarb, as a general rule, is preferable to all others. Hence its use in dyspepsia attended with constipation, in diarrhœa when purging is indicated, in the secondary stages of cholera infantum, in chronic dysentery, and in almost all typhoid diseases when fecal matter has accumulated in the intestines, or the use of cathartic medicine is necessary to prevent such accumulation. When employed in cases of habitual constipation, its astringent tendency should be counteracted by combining it with soap. Magnesia is also an excellent associate in disorders of the stomach and bowels. By combination with other cathartics, rhubarb frequently acquires additional activity, while it gives increased efficiency to the substance with which it is associated. A mixture of calomel and rhubarb is a brisk and powerful cathartic, much used in the commencement of our bilious fevers. As a general rule, rhubarb is not applicable to cases attended with much inflammatory action. Its griping effect may be counteracted by combining it with aromatics.

The dose of rhubarb as a purgative is from twenty to thirty grains, as a laxative and stomachic from five to ten grains. European rhubarb must be given in double or treble the dose to produce an equal effect. Few medicines are used in a greater variety of forms. It is most effectual in substance. It is frequently given in the shape of pill, combined with an equal proportion of soap, when its laxative effect is desired. The infusion is much used in cases of delicate stomach, and is peculiarly adapted to children. The syrup and tincture are also highly useful preparations. They are all officinal.

By the roasting of rhubarb its purgative property is diminished, while its astringency remains unaffected. This mode of treatment has, therefore, been sometimes resorted to in cases of diarrhœa. By long boiling the same effect is produced.

Off. Prep. Extractum Rhei, *Lond.; Dub.;* Infusum Rhei, *U.S., Lond., Ed., Dub.;* Pilulæ Rhei Comp., *U.S., Ed.;* Syrupus Rhei, *U.S.;* Syrupus Rhei Aromaticus, *U.S.;* Syrupus Rhei et Sennæ, *U.S.;* Tinctura Rhei, *U.S., Lond., Ed.;* Tinctura Rhei Comp., *Lond., Dub.;* Tinctura Rhei et Aloës, *U.S., Ed.;* Tinctura Rhei et Gentianæ, *U.S., Ed.;* Tinctura Rhei et Sennæ, *U.S.;* Vinum Rhei, *U.S., Ed.* W.

* * *

RHODODENDRI CHRYSANTHI FOLIA. *Ed.*

Leaves of the Yellow-flowered Rhododendron.

Rosage, *Fr.;* Gelbblühender Alpenbalsam, *Germ.;* Rhododendro aureo, *Ital.;* Sabina *Russian.*

Rhododendrum. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Ericeæ

Gen. Ch. Calyx five parted. *Corolla* nearly funnel-shaped. *Stamens* declined. *Capsule* five-celled. *Willd.*

Rhododendrum chrysanthum. Willd. *Sp. Plant.* ii. 605; Woodv. *Med Bot.* p. 299. t. 103. This is a beautiful evergreen shrub, about a foot high with spreading branches, and oblong, obtuse, thick leaves, narrowed toward their footstalks, reflexed at the margin, much veined, rugged and deep gree upon their upper surface, ferruginous or glaucous beneath, and surrounding th branches upon strong petioles. The flowers are large, yellow, on long peduncles, and arranged in terminal umbels. The corolla is wheel-shaped, wit its border divided into five roundish, spreading segments. The plant is a native of Siberia, delighting in mountainous situations, and flowering in Jun and July. The leaves are the part used in medicine.

When fresh they have a feeble odour, said to resemble that of rhubarb.

the dried state they are inodorous, but have an austere, astringent, bitterish aste. They yield their virtues to water and alcohol.

Medical Properties and Uses. The leaves of this species of Rhododendron are stimulant, narcotic, and diaphoretic, producing, when first taken, increase of heat and arterial action, subsequently a diminished frequency of he pulse, and in large doses, vomiting, purging, and delirium. They have een long employed by the natives of Siberia as a remedy in rheumatism, nd their use has extended to various parts of Europe. Their action is said o be accompanied with a sensation of creeping or pricking in the affected art, which subsides in a few hours, leaving the part free from pain. They ave been recommended also in gout, lues venerea, and palsy. In Siberia hey are prepared by infusing two drachms of the dried leaves in about ten unces of water, in a close earthen vessel, and keeping the liquid near the oiling heat during the night. The strained liquor is taken in the morning; nd a repetition of the dose three or four days successively generally effects cure. The remedy is not used in this country. W.

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RHŒADOS PETALA. *Lond.*

Petals of the Red Poppy.

"Papaver Rhœas. *Petala.*" *Lond.*

Off. Syn. PAPAVER RHŒAS. Petala. *Dub.*

Coquelicot, *Fr.;* Wilder Mohn, Klapperrose, *Germ.;* Rosolaccio, *Ital.;* Amapola, *Span.*

Papaver. See OPIUM.

Papaver Rhœas. Willd. *Sp. Plant.* ii. 1146; Woodv. *Med. Bot.* p. 387. . 139. The *red* or *corn poppy* is distinguished by its hairy stem, which s branched and rises about a foot in height, by its incised pinnatifid leaves, y its urn-shaped capsule, and by the full, bright, scarlet colour of its petals. t is a native of Europe, where it grows wild in great abundance, adorning specially the fields of grain with its brilliant flower. It has been introduced and naturalized in this country.

Its capsules contain the same kind of milky juice as that found in the . *somniferum*, and an extract has been prepared from them having the roperties of opium; but the quantity is too small to repay the trouble of s preparation. The petals are the officinal portion. They have a narcotic mell, and a mucilaginous slightly bitter taste. Chevallier has detected a ery minute proportion of morphia in an extract obtained from them (*Dict. es Drogues*); but their operation on the system is exceedingly feeble, and ey are valued more for their beautiful scarlet colour which they communicate to water, than for their medical virtues. They are rejected by the harmacopœias of the United States and of Edinburgh, but are recognised s officinal by those of London and Dublin, and by the French Codex. A yrup is prepared from them, which was formerly prescribed as an anodyne catarrhal affections; but is now little esteemed, except for the beauty of its olour.

Off. Prep. Syrupus Rhœados, *Lond.;* Syrupus Papaveris Rhœadis, *ub.*

W.

RHUS GLABRUM. *U.S. Secondary.*

Sumach.

"Rhus glabrum. Baccæ. *The berries.*" *U.S.*

Rhus. *Sex. Syst.* Pentandria Trigynia.—*Nat. Ord.* Terebintaceæ, *Juss.*; Anacardiaceæ, *Lindley.*

Gen. Ch. *Calyx* five-parted. *Petals* five. *Berry* small, with one nuciform seed. *Nuttall.*

Of this genus there are several species which possess poisonous properties, and should be carefully distinguished from that here described. For an account of them the reader is referred to the article *Toxicodendron.*

Rhus glabrum. Willd. *Sp. Plant.* i. 1478. This species of Rhus, called variously *smooth sumach*, *Pennsylvania sumach*, and *upland sumach*, is an indigenous shrub from four to twelve feet high, with a stem usually more or less bent, and divided into straggling branches, covered with a smooth light gray or somewhat reddish bark. The leaves are upon smooth petioles, and consist of many pairs of opposite leaflets, with an odd one at the extremity, all of which are lanceolate, acuminate, acutely serrate, glabrous, green on their upper surface, and whitish beneath. In the autumn their colour changes to a beautiful red. The flowers are greenish-red, and disposed in large, erect, terminal, compound thyrses, which are succeeded by clusters of small crimson berries covered with a silky down.

The shrub is found in almost all parts of the United States, growing in old neglected fields, along fences, and on the borders of woods. The flowers appear in July, and the fruit ripens in the early part of autumn. The bark and leaves are astringent, and said to be used in tanning leather and in dyeing. Excrescencies are produced under the leaves resembling galls in character, and containing large quantities of tannin and gallic acid. These have been used as a substitute for the imported galls by Dr. Walters of New York, who thinks them, in every respect, preferable. They may be collected at little expense, as they are produced very abundantly, especially in the Western States. (*A. W. Ives' edition of Paris's Pharmacologia.*) But the only officinal part of the plant is the berries.

These have a sour, astringent, not unpleasant taste, and are often eaten by the country people with impunity. According to Mr. Cozzens of New York, the acid to which they owe their sourness is the malic and is contained in the pubescence which covers their surface; as, when it is washed away by warm water, the berries are wholly free from acidity. Professor W. B. Rogers of Virginia found the acid combined with lime, in the state of bimalate.

Medical Properties and Uses. Sumach berries are astringent and refrigerant; and their infusion has been recommended as a cooling drink in febrile complaints, and a pleasant gargle in inflammation and ulceration of the throat. By Dr. Fahnestock an infusion of the inner bark of the root, employed as a gargle, is considered almost as a specific in the sore mouth attending inordinate mercurial salivation. (*Am. Journ. of Med. Sciences*, v. 61.) W.

ROSA CENTIFOLIA. *U. S.*

Hundred-leaved Roses.

"Rosa centifolia. Petala. *The petals.*" *U.S.*

Off. Syn. ROSÆ CENTIFOLIÆ PETALA. *Lond.*, *Ed,;* ROSA CENTIFOLIA. Petala. *Dub.*

Roses à cent feuilles, *Fr.;* Hunderblätteridge Rose, *Germ.;* Rosa pallida, *Ital.;* Rosa de Alexandria, *Span.*

Rosa. *Sex. Syst.* Icosandria Polygynia.—*Nat. Ord.* Rosaceæ.

Gen. Ch. *Petals* five. *Calyx* urceolate, five-cleft, fleshy, contracted at the neck. *Seeds* numerous, hispid, attached to the inner side of the calyx. *Willd.*

Rosa centifolia. Willd. *Sp. Plant.* ii. 1071; Woodv. *Med. Bot.* p. 495. t. 178. This species of rose has prickly stems, which usually rise from three to six feet in height. The leaves consist of two or three pairs of leaflets, with an odd one at the end, closely attached to the common footstalk, which is rough, but without spines. The leaflets are ovate, broad, serrate, pointed, and hairy on the under surface. The flowers are large, with many petals, usually of a pale red colour, and supported upon peduncles beset with short bristly hairs. The germ is ovate, and the segments of the calyx semi-pinnate. The varieties of the *R. centifolia* are very numerous, but may be indiscriminately employed. The plant is now cultivated in gardens all over the world; but its original country is not certainly known. It has sometimes been mistaken for the damask rose, which is a distinct species.

The petals are the officinal portion. They are extremely fragrant, and have a sweetish, slightly acidulous, somewhat bitterish taste. Their odour depends on a volatile oil, which may be separated by distillation with water, and is sold at a very high price, under the title of *essence* or *attar of roses.* It is furnished in very minute proportion, not more than three drachms having been obtained by Colonel Polier, in Hindostan, from one hundred pounds of the petals without the calyxes. It is prepared on a large scale in Egypt, Persia, Cashmire, India, and other countries of the East. In cool weather it is concrete; and adulterations with other volatile oils, which are very common, may thus be detected. The water which is distilled with the oil, has in a high degree the fragrance of the flower.

The petals are slightly laxative, and are sometimes administered in the form of syrup combined with cathartic medicines; but their chief use is in the preparation of rose-water.

Off. Prep. Aqua Rosæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Syrupus Rosæ, *Lond.*, *Ed.*, *Dub.* W.

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ROSA GALLICA. *U.S.*

Red Roses.

"Rosa Gallica. Petala. *The petals.*" *U.S.*

Off. Syn. ROSÆ GALLICÆ PETALA. *Lond.*, *Ed.;* ROSA GALLICA. Petala. *Dub.*

Roses rouges, *Fr.;* Französische Rose, Essig-rosen, *Germ.;* Rosa domestica, *Ital.;* Rosa rubra o Castillara, *Span.*

Rosa. See ROSA CENTIFOLIA.

Rosa Gallica. Willd. *Sp. Plant.* ii. 1071; Woodv. *Med. Bot.* p. 498. t. 179. This species is smaller than the *R. centifolia*, but resembles it in the character of its foliage. The stem is beset with short bristly prickles. The flowers are very large, with obcordate widely spreading petals, which are of a rich crimson colour, and less numerous than in the preceding species. In the centre is a crowd of yellow anthers on thread-like filaments, and as many villose styles bearing papillary stigmas. The fruit is oval, shining, and of a firm consistence. The red rose is a native of the South of Europe, and is cultivated in gardens throughout the United States.

The petals, which are the part employed, should be gathered before the flower has blown, separated from their claws, dried in a warm sun or by the fire, and kept in a dry place. Their odour, which is less fragrant than that of the *R. centifolia*, is improved by drying. They have a pleasantly astringent and bitterish taste; and contain, according to M. Cartier, tannin, gallic acid, colouring matter, a volatile oil, a fixed oil, albumen, soluble salts of potassa, insoluble salts of lime, silica, and oxide of iron. (*Journ. de Pharm.* vii. 531.) Their sensible properties and medical virtues are extracted by boiling water.

Medical Properties and Uses. Red roses are slightly astringent and tonic, and were formerly thought to possess peculiar virtues. They are at present chiefly employed in infusion, as an elegant vehicle for tonic and astringent medicines.

Off. Prep. Confectio Rosæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Infusum Rosæ Compositum, *U.S.*, *Lond.*, *Ed,*, *Dub,;* Mel Rosæ, *Lond.*, *Dub.;* Syrupus Rosæ Gallicæ, *Ed.;* Syrupus Sarsaparillæ, *U.S.* W.

ROSÆ CANINÆ PULPA. *Lond.*

Pulp of the Dog Rose.

"Rosa canina. *Baccarum pulpa expressa.*" *Lond.*

Off. Syn. ROSÆ CANINÆ FRUCTUS. *Ed.;* ROSA CANINA. Fructus. *Dub.*

Rose sauvage, *Fr.;* Hundsrose, *Germ.*

Rosa. See ROSA CENTIFOLIA.

Rosa canina. Willd. *Sp. Plant.* ii. 1077; Woodv. *Med. Bot.* p. 493. t. 177. The *dog rose*, *wild briar*, or *heptree*, is a native of Europe, distinguished as a species by its glabrous ovate germs, its smooth peduncles, its prickly stem and petioles, and its ovate, smooth, rigid leaves. It rises eight or ten feet in height, and bears white or pale red flowers, having usually five obcordate fragrant petals. The plant has been introduced into this country, but is not much cultivated.

The fruit is a fleshy, smooth, oval, red berry, of a pleasant, sweet, acidulous taste, and contains sugar and uncombined citric acid.

The pulp, separated from the seeds and the silky bristles in which they are embedded, is employed in Europe for the preparation of a confection, intended chiefly as a pleasant vehicle for other medicines.

Off. Prep. Confectio Rosæ Caninæ, *Lond.*, *Ed.* W.

ROSMARINUS. *U.S.*

Rosemary.

"Rosmarinus officinalis. Cacumina. *The tops.*" *U.S.*

Off. Syn. ROSMARINI CACUMINA. *Lond.*; RORISMARINI OFFICINALIS CACUMINA. *Ed.;* ROSMARINUS OFFICINALIS. Cacumina. *Dub.*

Romarin, *Fr.;* Rosmarin, *Germ.;* Rosmarino, *Ital.;* Romero, *Span.*

Rosmarinus *Sex. Syst.* Diandria Monogynia.—*Nat. Ord.* Labiatæ.

Gen. Ch. *Corolla* unequal, with the upper lip two-parted. *Filaments* long, curved, simple, with a tooth. *Willd.*

Rosmarinus officinalis. Willd. *Sp. Plant.* i. 126; Woodv. *Med. Bot.* p. 329. t. 117. Rosemary is an evergreen shrub, three or four feet high, with an erect stem, divided into many long, slender, ash-coloured branches. The leaves are numerous, sessile, opposite, more than an inch long, about one-sixth of an inch broad, linear, entire, obtuse at the summit, turned backward at the edges, of a firm consistence, smooth and green on the upper surface, whitish and somewhat downy beneath. The flowers are pale blue or white, of considerable size, and placed in opposite groups at the axils of the leaves, towards the ends of the branches. The seeds are four in number, of an oblong shape, and naked in the bottom of the calyx.

The plant grows spontaneously in the countries which border on the Mediterranean, and is cultivated in the gardens of Europe and this country. The flowering summits are the officinal portion.

These have a strong balsamic odour, which is possessed, though in a less degree, by all parts of the plant. Their taste is bitter and camphorous. These properties are imparted partially to water, completely to alcohol, and depend on a volatile oil which may be obtained by distillation. (See *Oleum Rosmarini.*) The tops lose a portion of their sensible properties by drying, and become inodorous by age.

Medical Properties and Uses. Rosemary is gently stimulant, and has been considered emmenagogue. In the practice of this country it is scarcely used; but in Europe, especially on the continent, it enters into the composition of several syrups, tinctures, &c., to which it imparts its agreeable odour and excitant property. It is sometimes added to sternutatory powders, and is used externally in connexion with other aromatics in the form of fomentation. In some countries it is employed as a condiment; and its flowers, which are much sought after by the bees, impart their peculiar flavour to the honey of the districts in which the plant abounds.

Off. Prep. Oleum Rosmarini, *U. S.*, *Lond.*, *Ed.*, *Dub.;* Spiritus Rosmarini, *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

RUBIA. *U.S. Secondary.*

Madder.

"Rubia tinctorum. Radix. *The root.*" *U.S.*

Off. Syn. RUBIÆ RADIX. *Lond.;* RUBIÆ TINCTORUM RADIX. *Ed.;* RUBIA TINCTORUM. Radix. *Dub.*

Garance, *Fr.;* Krappwurzel, *Germ.;* Robbia, *Ital.;* Rubia de tintoreros, Granza, *Span.*

Rubia. *Sex. Syst.* Tetrandria Monogynia.—*Nat. Ord.* Rubiaceæ.

Gen. Ch. *Corolla* one-petaled, bell-shaped. *Berries* two, one-seeded. *Willd.*

Rubia tinctorum. Willd. *Sp. Plant.* i. 603; Woodv. *Med. Bot.* p. 173. t. 67. The root of the *dyers' madder* is perennial, and consists of numerous long, succulent fibres, varying in thickness from the size of a quill to that of the little finger, and uniting at top in a common head, from which also proceed side-roots that run near the surface of the ground, and send up many annual stems. These are slender, quadrangular, jointed, procumbent, and furnished with short prickles by which they adhere to the neighbouring plants upon which they climb. The leaves are elliptical, pointed, rough, firm, about three inches long and nearly one inch broad, having rough points on their edges and midrib, and standing at the joints of the stem in whorls of four, five, or six together. The branches rise in pairs from the same joints, and bear small yellow flowers at the summit of each of their subdivisions. The fruit is a round, shining, black berry.

The plant is a native of the South of Europe, and is cultivated in France and Holland. It is from the latter country that commerce derives its chief supply. The root, which is the part used, is dug up in the third summer, and having been deprived of its cuticle, is dried by artificial heat, and then reduced to a coarse powder. In this state it is packed in barrels, and sent into the market.

The root is invested with a brown epidermis, but is internally throughout its whole substance of a deep-red colour. The powder, as kept in the shops, is brownish-red.

Madder has a weak peculiar odour, and a bitterish astringent taste; and imparts these properties, as well as a red colour, to water and alcohol. Among its constituents are two colouring principles, one of which, named by Robiquet and Collin *alizarin*, is of an orange-red colour, inodorous, insipid, crystallizable, capable of being sublimed without change, scarcely soluble in cold water, soluble in boiling water, and very readily so in alcohol, ether, the fixed oils, and liquid alkalies. The alcoholic and watery solutions are rose-coloured; the ethereal, golden-yellow; the alkaline, violet and blue when concentrated, but violet-red when sufficiently diluted. A beautiful rose-coloured lake is produced by precipitating a mixture of the solutions of alizarin and alum. The other colouring principle is yellow, and named *xanthin* by Kuhlmann. It is very soluble in water, soluble in alcohol, scarcely so in ether. Its solution is made orange-red by the action of the alkalies, and citron-yellow by that of the acids. It has a sweetish bitterish taste. Madder also contains sugar; and Döbereiner succeeded in obtaining alcohol from it by fermentation and distillation, without affecting its colouring properties. It is much used by the dyers.

Medical Properties and Uses. Madder was formerly thought to be emmenagogue and diuretic; and was used in amenorrhœa, dropsy, jaundice, and visceral obstructions. It is still occasionally prescribed in suppressed menstruation; but physicians generally have no confidence in its efficacy in this or any other complaint. When taken into the stomach it imparts a red colour to the milk and urine, and to the bones of animals, without sensibly affecting any other tissue. The effect is observable most quickly in the bones of young animals, and in those nearest the heart. Under the impression that it might effect some change in the osseous system, it has been prescribed in rachitis, but without any favourable result. The dose is about half a drachm, repeated three or four times a day. W.

RUBUS TRIVIALIS. *U.S. Secondary.*

Dewberry-root.

"Rubus trivialis. Radix. *The root.*" *U.S.*

RUBUS VILLOSUS. *U.S. Secondary.*

Blackberry-root.

"Rubus villosus. Radix. *The root.*" *U.S.*

Rubus. *Sex. Syst.* Icosandria Polygynia.—*Nat. Ord.* Rosaceæ.

Gen. Ch. *Calyx* five-cleft. *Petals* five. *Berry* compound, with one-seeded acini. *Willd.*

Of this extensive genus not less than twenty species are indigenous in the United States, where they are called by the various names of *raspberry*, *blackberry*, *dewberry*, *cloudberry*, *&c.* Most of them are shrubby or suffruticose briers, with astringent roots and edible berries; some have annual stems without prickles. The only officinal species are the *R. trivialis* and *R. villosus*, which, so far as relates to their medical properties, are so closely alike, as not to require a separate description.

1. *Rubus trivialis.* Michaux, *Flor. Americ.* i. 296. The *dewberry*, sometimes also called *low-blackberry*, or *creeping blackberry*, has a slender, prickly stem, which runs along the ground, and occasionally puts forth roots. The leaves are petiolate, and composed of three or five leaflets, which are oblong oval, acute, unequally serrate, and somewhat pubescent The stipules are awl-shaped. The flowers are large, white, and nearly solitary, with elongated pedicels, and peduncles, which, like the leafstalks, are armed with recurved, hispid prickles. The petals are generally obovate, and three times longer than the calyx. In one variety they are orbicular. The plant grows abundantly in old fields and neglected grounds in all parts of the United States. Its fruit is large, black, of a very pleasant flavour, and ripens somewhat earlier than that of the *R. villosus*.

2. *R. villosus.* Willd. *Sp. Plant.* ii. 1085; Bigelow, *Am. Med. Bot.* ii. 160; Barton, *Med. Bot.* ii. 151. The stem of the blackberry is somewhat shrubby, from three to seven feet high, branching, more or less furrowed and angular, and armed with strong prickles. The smaller branches and young shoots are herbaceous. The leaves are ternate or quinate; the leaflets ovate, acuminate, unequally and sharply serrate, and pubescent on both sides; the footstalk and midrib usually armed with short recurved prickles. The flowers are large, white, and in erect racemes, with a hairy, prickly stalk. The calyx is short, with acuminate segments. The fruit is first green, then red, and when perfectly ripe, of a shining black colour, and very pleasant taste. It is a compound berry, consisting of numerous pulpy one-seeded globules or acini attached to the receptacle. This species of Rubus is, perhaps, the most abundant of those indigenous in the United States, growing in neglected fields, along fences, on the borders of woods, in forest glades, and wherever tillage or too much shade and moisture does not interfere with it. Its flowers appear from May to July, and its fruit is ripe in August.

The berries of both these species of Rubus are much used as food; and a jelly made from them is in great esteem as an article of diet, and even as a remedy in dysenteric affections. The roots only are officinal.

These are branching, cylindrical, of various dimensions, from nearly an inch in thickness down to the size of a straw, ligneous, and covered with a thin bark, which is externally of a light brownish or reddish-brown colour. The root is inodorous. The bark has a bitterish strongly astringent taste, the ligneous portion is nearly insipid, and comparatively inert. The smaller roots, therefore, should be selected for use; or if the thicker pieces are employed, the cortical part should be separated, and the wood rejected. The virtues of the root are extracted by boiling water, and by diluted alcohol. They depend chiefly, if not exclusively, upon tannin, which experiment has proved to be an abundant constituent.

Medical Properties and Uses. Dewberry and blackberry roots are tonic and strongly astringent. They have long been a favourite domestic remedy in bowel affections; and from popular favour have passed into regular medical use. Given in the form of decoction, they are usually acceptable to the stomach, without being offensive to the taste; and may be employed with great advantage in cases of diarrhœa from relaxation of the bowels, whether in children or adults. We can add our own decided testimony to that of others who have spoken favourably of their use in this complaint; and there is no doubt that they are applicable to all other cases in which the vegetable astringents are found serviceable. The decoction may be prepared by boiling an ounce of the smaller roots, or of the bark of the larger, in a pint and a half of water down to a pint; of which from one to two fluidounces may be given to an adult three or four times, or more frequently during the twenty-four hours. The dose of the powdered root is twenty or thirty grains.

W.

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RUMEX AQUATICUS. Radix. *Dub.*

Water Dock Root.

RUMEX BRITANNICA. *U.S. Secondary.*

Water Dock.

"Rumex Britannica. Radix. *The root.*" *U.S.*

RUMEX OBTUSIFOLIUS. *U.S. Secondary.*

Blunt-leaved Dock.

"Rumex obtusifolius. Radix. *The root.*" *U.S.*

Rumex. *Sex. Syst.* Hexandria Trigynia.—*Nat. Ord.* Polygoneæ.

Gen. Ch. Calyx three-leaved. *Petals* three, converging. *Seed* one, three-sided. *Willd.*

Calyx six-parted, persistent, the three interior divisions petaloid, connivent. *Seed* one, three-sided, superior, naked. *Stigmata* multifid. *Nuttall.*

We have placed together the three officinal species of dock, because their virtues are so nearly alike that a separate consideration would lead to unnecessary repetition. The roots of several other species have been medicinally employed. Those of the *R. Patientia*, and *R. alpinus*, European plants, and of the *R. crispus*, *R. acutus*, and *R. sanguineus*, which belong both to Europe and the United States, are recognised by the French

Codex, and may be used indiscriminately with those which are considered officinal with us. Several species of Rumex have acid leaves, which are sometimes used in medicine. Such are the *R. Acetosa*, *R. Acetosella*, and *R. scutatus*. These are more particularly noticed in another place. (See *Acetosæ Folia.*)

The docks are herbaceous plants with perennial roots. Their flowers are in terminal or axillary panicles. Some of the species are diœcious; but all those here described have perfect flowers.

1. *Rumex aquaticus*. Willd. *Sp. Plant.* ii. 255; Woodv. *Med. Bot.* p. 658. t. 229. The *water dock* has a large thick root, externally black, internally whitish, with an erect stem from three to five feet high, furnished with smooth, lanceolate, pointed leaves, of which the lower are cordate at their base. The three petals, or, as some botanists consider them, the three interior divisions of the calyx, approach each other so as to assume a triangular shape, and in this state are called *valves*. These are large, ovate, entire, and are each furnished with a small, linear, often obscure grain, extending down the middle. The plant is a native of Europe, but naturalized in America. It grows in this country in small ponds and ditches, and flowers in July and August. It is thought to be the *Herba Britannica* of the ancients, celebrated for the cure of scurvy and diseases of the skin.

2. *R. Britannica*. Willd. *Sp. Plant.* ii. 250. This species is distinguished in the vernacular language by the name of *yellow-rooted water dock*. The root is large, dark on the outside, and yellow within. The stem is two or three feet high, and bears broad lanceolate, smooth, flat leaves, with the sheathing stipules slightly torn. The spikes of the panicle are leafless; the valves entire and all graniferous. The plant is indigenous, inhabiting low, wet places, and flowering in June and July.

3. *R. obtusifolius*. Willd. *Sp. Plant.* ii. 254; Loudon's *Encyc. of Plants*, p. 293. The root of the *blunt-leaved dock* is externally brown, internally yellow; the stem two or three feet high and somewhat rough; the radical leaves ovate cordate, obtuse, and very large; the valves dentate and one of them conspicuously graniferous. It is a common weed in our rich grounds and pastures, but is supposed to have been introduced from Europe. Its flowers appear in June and July.

4. *R. crispus*. Willd. *Sp. Plant.* ii. 251. This common species, though not officinal, is perhaps equally entitled to notice with those which are so. It has a yellow, spindle-shaped root, with a smooth furrowed stem two or three feet high, and lanceolate, waved, pointed leaves. The valves are ovate, entire, and all graniferous. It is a native of Europe, and grows wild in this country. It is common in our dry fields and pastures, and about barn yards, and flowers in June and July.

Dock-root, from whatever species derived, has an astringent bitter taste, with little or no smell. It readily yields its virtues to water by decoction. It has not been accurately analyzed; but, according to M. Deyeux, the root of the common European dock (*R. Patientia*) contains, among other ingredients, sulphur, starch, and acetate of lime. The leaves of most of the species are edible, and are occasionally used as spinage. They are somewhat laxative, and form an excellent diet in scorbutic cases. The roots are used to dye a yellow colour.

Medical Properties and Uses. The medical properties of dock-root are those of an astringent and mild tonic. It is also supposed to possess an alterative property, which renders it useful in scorbutic disorders, and cutaneous eruptions, particularly the itch, in the cure of which it enjoyed at one time considerable reputation. It is said to have proved useful also in syphilis.

Dr. Thomson found a decoction of the root of the *R. Patientia* very efficacious in obstinate ichthyosis. (*London Dispensatory.*) The *R. aquaticus*, and *R. Britannica*, are the most astringent. The roots of some species unite a laxative with the tonic and astringent property, resembling rhubarb somewhat in their operation. Such are those of the *R. crispus* and *R. obtusifolius*; and the *R. alpinus* has in some parts of Europe the common name of *mountain rhubarb*. (*Paris Codex.*) This resemblance of properties is not singular, as the two genera belong to the same natural family. Dock-root is given in powder or decoction. Two ounces of the fresh root bruised, or one ounce of the dried, may be boiled in a pint of water, of which two fluidounces may be given at a dose, and repeated as the stomach will bear it. The root has often been applied externally in the shape of ointment, cataplasm, and decoction, to the various cutaneous eruptions and ulcerations for which its internal use is recommended. The powdered root is recommended as a dentifrice, especially when the gums are spongy. W.

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RUTÆ FOLIA. *Lond.*

Rue Leaves.

"Ruta graveolens. *Folia.*" *Lond.*

Off. Syn. RUTÆ GRAVEOLENTIS HERBA. *Ed.;* RUTA GRAVEOLENS. Folia. *Dub.*

Rue odorante, *Fr.;* Garten-Raute, *Germ.;* Ruta, *Ital.;* Ruda, *Span.*

Ruta. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Rutaceæ.

Gen. Ch. *Calyx* five-parted. *Petals* concave. *Receptacle* surrounded by ten melliferous points. *Capsule* lobed. *Willd.*

Ruta graveolens. Willd. *Sp. Plant.* ii. 542; Woodv. *Med. Bot.* p. 487. t. 174. Common rue is a perennial plant, usually two or three feet high, with several shrubby branching stems, which, near the base, are woody and covered with a rough bark, but in their ultimate ramifications are smooth, green, and herbaceous. The leaves are doubly pinnate, glaucous, with obovate, sessile, obscurely crenate, somewhat thick and fleshy leaflets. The flowers are yellow, and disposed in a terminal branched corymb upon subdividing peduncles. The calyx is persistent, with four or five acute segments; the corolla consists of four or five concave petals somewhat sinuate at the margin. The stamens are usually ten, but sometimes only eight in number. The plant is a native of the South of Europe, but cultivated in our gardens. It flowers from June to September. The whole herbaceous part is active; but the leaves are usually employed.

These have a strong disagreeable odour, especially when rubbed. Their taste is bitter, hot, and acrid. In the recent state, and in full vigour, they have so much acrimony as to inflame and even blister the skin, if much handled; but the acrimony is diminishsd by drying. Their virtues depend chiefly on a volatile oil which is very abundant, and is contained in glandular vesicles, apparent over the whole surface of the plant. Besides volatile oil, they contain, according to Mähl, chlorophylle, albumen, an azotized substance, extractive, gum, starch or inulin, malic acid, and lignin. Both alcohol and water extract their active properties.

Medical Properties and Uses. Rue is stimulant and antispasmodic, and like most other substances which excite the circulation, occasionally increases the secretions, especially when they are deficient from debility. It is sometimes used in hysterical affections, flatulent colic, and amenorrhœa, particularly in the last complaint. It has also been given in worms. The ancients employed it as a condiment, and believed it to possess, besides other valuable properties, that of resisting the action of poisons. Its excitant and irritating properties require that it should be used with caution. The dose of the powder is from fifteen to thirty grains two or three times a day. The medicine is also given in infusion and extract.

Off. Prep. Confectio Rutæ, *Lond., Dub.;* Extractum Rutæ Graveolentis, *Ed., Dub.;* Oleum Rutæ, *Dub.*

W.

SABBATIA. *U. S.*

American Centaury.

"Sabbatia angularis. Herba. *The herb.*" *U. S.*

This is the *Chironia angularis* of Linnæus, but as it wants some of the essential characters of the genus Chironia, it has been separated from it by subsequent botanists, and now ranks in the genus *Sabbatia* of Adanson.

Sabbatia. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Gentianeæ.

Gen.Ch. *Calyx* five to twelve-parted. *Corolla* rotate, five to twelve-parted. *Stigmas* two, spiral. *Anthers* at length revolute. *Capsule* one-celled, two-valved, many-seeded. *Nuttall.*

Sabbatia angularis. Pursh, *Flor. Am. Sept.* 137; Bigelow, *Am. Med. Bot.* iii. 147; Barton, *Med. Bot.* i. 255. The American centaury is an annual or biennial herbaceous plant, with a fibrous root, and an erect, smooth, four-sided stem, winged at the angles, simple below, sending off opposite axillary branches above, and rising one or two feet in height. The leaves, which vary considerably in length and width, are ovate, entire, acute, nerved, smooth, opposite, and sessile, embracing half the circumference of the stem at their base. The flowers are numerous, growing on the ends of the branches, and forming altogether a large terminal corymb. The calyx is divided into five lanceolate segments, considerably shorter than the corolla. This is deeply five parted, with obovate segments of a beautiful delicate rose-colour, which is paler and almost white in the middle of their under surface. The anthers are yellow, and after shedding their pollen become revolute. The style, which is bent downward and longer than the stamens, terminates in two linear stigmas, which become spirally twisted together.

The plant is widely diffused through the Middle and Southern States, growing in low meadow grounds, and in wet seasons upon uplands, in woods and neglected fields. It flowers in July and August. In its general aspect as well as medical properties, it bears a close resemblance to the *Erythræa*, formerly *Chironia Centaurium*, or European centaury, for which it was mistaken by the earlier settlers. The whole herb is employed, and should be collected when in flower.

All parts of it have a strongly bitter taste, without any admixture of astringency or other peculiar flavour. Both alcohol and water extract its bitterness, together with its medical virtues.

Medical Properties and Uses. American centaury has the tonic properties of the simple bitters, and is very analogous in its action to the other plants belonging to the same natural family. It has long been popularly employed as a prophylactic and remedy in our autumnal intermittent and remittent fevers; and has found much favour with the medical profession in the latter of these complaints. The state of the fever to which it is particularly applicable, is that which exists in the intervals between the paroxysms, when the remission is such as to call for the use of tonics, but is not sufficiently decided to justify a resort to the preparations of Peruvian bark. It is also occasionally useful during the progress of a slow convalescence, by promoting appetite and invigorating the digestive function; and may be employed for the same purpose in dyspepsia and diseases of debility.

The most convenient form of administration is that of infusion. A pint of boiling water poured on an ounce of the herb and allowed to cool, may be given in the dose of two fluidounces, repeated every hour or two during the remission of fevers, and less frequently in chronic affections. The dose of the powder is from thirty grains to a drachm. The decoction, extract, and tincture are also efficient preparations. W.

SABINA. *U.S.*

Savine.

"Juniperus sabina. Folia. *The leaves.*" *U.S.*

Off. Syn. SABINÆ FOLIA. *Lond.;* JUNIPERI SABINÆ FOLIA. *Ed.;* JUNIPERUS SABINA. Folia. *Dub.*

Sabine, *Fr.;* Sevenbaum, *Germ.;* Sabina, *Ital., Span.*

JUNIPERUS. See JUNIPERUS.

Juniperus Sabina. Willd. *Sp. Plant.* iv. 852; Woodv. *Med. Bot.* p. 10. t. 5. This is an evergreen shrub, rising from three or four feet to fifteen feet in height, with numerous erect, pliant branches, very much subdivided. The bark of the young branches is light green, that of the trunk, rough and reddish-brown. The leaves, which completely invest the younger branches, are numerous, small, erect, firm, smooth, pointed, of a dark green colour, glandular in the middle, opposite, and imbricated in four rows, The flowers are male and female on different trees. The fruit is a blackish-purple berry, of an ovoid shape, marked with tubercles, the remains of the calyx and petals, and containing three seeds.

The savine is a native of the South of Europe and the Levant. It is said also to grow wild in the neighbourhood of our Northwestern lakes. The ends of the branches, and the leaves by which they are invested, are collected for medical use in the spring. When dried they fade very much in colour.

There is reason to believe that the *Juniperus Virginiana*, or common red cedar, is sometimes substituted in the shops for the savine, to which it bears so close a resemblance as to be with difficulty distinguished. The two species, however, differ in their taste and smell. In the *J. Virginiana*, moreover, the leaves are sometimes ternate.

The tops and leaves of savine have a strong, heavy, disagreeable odour, and a bitter, acrid taste. These properties are owing to a volatile oil which is obtained by distillation with water. (See *Oleum Sabinæ.*) They impart their virtues to alcohol and water.

Medical Properties and Uses. Savine is highly stimulant, increasing most of the secretions, especially those of the skin and uterus, to the latter of which organs it is supposed to have a peculiar direction. It has been much used in amenorrhœa, and occasionally as a remedy for worms. Dr. Chapman strongly recommends it in chronic rheumatism. At present, however, it is not generally employed; and in no case should it be given when much general or local excitement exists. In pregnancy it should always be avoided. It is most conveniently administered in the form of powder, of which the dose is from five to fifteen grains, repeated three or four times a day.

As an external irritant it is very useful, in the form of cerate, for maintaining a discharge from blistered surfaces; but as the preparation sold in this country under the name of savine ointment, is often deficient in power, either from the age of the drug or the substitution of red cedar, it has in some measure fallen into disrepute. (See *Ceratum Sabinæ.*) In the state of powder or infusion, savine is used in Europe as an application to warts, indolent, carious, and gangrenous ulcers, psora, and tinea capitis; and the expressed juice of the fresh leaves, diluted with water, is sometimes applied to similar purposes.

Off. Prep. Ceratum Sabinæ, *U.S.*, *Lond.*, *Ed.*; Oleum Sabinæ, *Dub.*, *Ed.;* Unguentum Sabinæ, *Dub.* W.

SACCHARUM. *U.S.*

Sugar.

"Saccharum officinarum. Saccharum purificatum. *The refined sugar.*" *U.S.*

Off. Syn. SACCHARUM PURIFICATUM. *Lond.*, *Ed.;* SACCHARUM OFFICINARUM. Succus concretus purificatus. *Dub.*

White sugar; Sucre pur, Sucre en pains, *Fr.;* Weisser Zucker, *Germ.;* Zucchero en pane, *Ital.;* Azucar de pilon, Azucar refinado, *Span.*

SACCHARUM NON PURIFICATUM. *Ed.*

Brown Sugar.

Off. Syn. SACCHARUM. *Lond.;* SACCHARUM OFFICINARUM. Succus concretus non purificatus. *Dub.*

Raw or Muscovado sugar; Sucre brut, Cassonade rouge, Moscouade, *Fr.;* Gemeiner Zucker, *Germ.;* Zucchero brutto, *Ital.;* Azucar negro, *Span.*

SYRUPUS EMPYREUMATICUS. *Ed.*, *Dub.*

Molasses.

Mélasse, *Fr.*, *Germ.;* Melazzo, *Ital.;* Melaza, *Span.*

Sugar is a peculiar organic principle, neither acid nor alkaline, which is derived principally from vegetables, though occasionally from animal matter. As obtained from different sources, it presents shades of difference in its properties; and this circumstance has given rise to a number of varieties of this organic principle, distinguished by names derived from their source or mode of preparation. According to strict definition, no substance is considered a sugar, unless it be susceptible of the vinous fermentation; but we shall not use the term in this restricted sense; but call every substance a species of sugar which has more or less of the saccharine taste.

Sugar is found in the fruit, roots, and sap of many vegetables. All the sweet fruits contain it, especially the grape, which furnishes a distinct variety of sugar; and it is present, in larger or smaller amount, in the turnip, the onion, and the beet. This latter root is cultivated extensively in France for the purpose of yielding sugar; and it was supposed in 1830 that one-twentieth of the immense consumption of that country was furnished from this source alone, and the proportion of the domestic supply to the foreign is annually increasing. In the north-western parts of the United States, as well as in Canada, considerable quantities of sugar are manufactured from the sap of the sugar maple (*Acer saccharinum*). The process pursued is described by Dr. Rush in a paper published in the third volume of the American Philosophical Transactions. But the supply of sugar from the above sources is insignificant compared with that obtained from the sugar cane, which is extensively cultivated in the East and West Indies, Brazil, and some of our Southern States, particularly Louisiana, for the purpose of being manufactured into sugar. This plant is the *Saccharum officinarum* of botanists, and is the source of the officinal sugars of the Pharmacopœias.

Saccharum. *Sex. Syst.* Triandria Digynia.—*Nat. Ord.* Gramineæ.

Gen. Ch. *Calyx* two-valved, involucred, with long down. *Corolla* two-valved. *Willd.*

Saccharum officinarum. Willd. *Sp. Plant.* i. 321; *Phil. Trans.* lxix. 207. The sugar cane is an herbaceous plant, possessing a jointed, succulent root, from which arise several shining, jointed stems, from an inch to an inch and a half in diameter and eight or ten feet high, and containing a white and juicy pith. The joints are about three inches apart, and give origin to the leaves, which embrace the stem at their base, are three or four feet long, and about an inch wide, flat, acuminate, longitudinally striated, furnished with a white midrib, glabrous, finely dentate, and of a green colour inclining to yellow. The flowers are whitish, surrounded by a long silky down, and disposed in a large, terminal, nearly pyramidal panicle, composed of subdivided spikes, and two or three feet in length. The plant may be said to have a general resemblance to the Indian corn. There are two varieties, the common and the Otaheitan, the latter of which was introduced into the West Indies from the island of Tahiti (Otaheite) by Bougainville and Bligh. It is distinguished by its greater height, the longer intervals between its joints, and by the greater length of the hairs which surround the flowers.

The sugar cane is a native of the tropical regions of both the old and new continents. It is cultivated by cuttings, which are planted in rows, and which, by giving rise to successive shoots, furnish five or six crops before the plants require to be renewed. At the end of a year the plant generally flowers, and in four or five months afterwards, the canes are completely ripe, at which time they have a yellowish colour, and contain a sweetish viscid juice. The quantity of sugar which they yield is very variable, ranging from six to fifteen per cent. Its separation is founded upon its property of crystallization, which is possessed by the sugar alone of all the substances present in the juice.

Preparation and Purification. The canes being ripe, are cut down close to the earth, topped, and stripped of their leaves, and then crushed between iron rollers in a kind of mill. The juice, as it runs out, is received in suitable vessels, and being quickly removed, is immediately mixed with lime in the proportion of one part to eight hundred of the juice, and heated in a boiler to 140°. The gluten and albumen combine with the lime, and form a thick scum, from underneath which the liquid is drawn off by a cock into a copper boiler, where it is concentrated by ebullition, the froth being carefully skimmed off as it forms. When sufficiently concentrated, it is transferred to shallow vessels called coolers, from which, before it is cool, it is drawn off into wooden vessels, with perforated bottoms, the holes in which are temporarily plugged. At the end of twenty-four hours, the liquid is strongly agitated with wooden stirrers, in order to accelerate the granulation of the sugar, which is completed in six hours. The stoppers are now removed, and the syrup allowed to drain off from the sugar, which in this state is granular, of a yellowish colour, and moist. It is next dried in the sun, and being introduced into hogsheads, forms the *brown sugar* of commerce. The syrup, by a new evaporation, furnishes an additional portion of sugar; and the portion which finally remains, incapable of yielding more sugar, is the liquid called *molasses*. Sometimes the brown sugar undergoes an additional preparation, consisting in boiling it with lime-water, and, after sufficient concentration, allowing the syrup to crystallize in large inverted conical vessels, pierced at the apex and plugged. The surface of the crystalline mass being covered with a thin mixture of clay and water, the plug is removed, and the water from the clay penetrating the mass, removes the coloured syrup, which flows out at the hole. The sugar in this state approaches to the white state, and constitutes the clayed sugar of commerce, usually called in this country *Havana sugar*. It is still, however, far from being pure.

The purification of brown sugar constitutes a distinct branch of business, and the methods pnrsued have undergone many changes and improvements. By the original process, the sugar was boiled with lime-water, and clarified by means of bullocks' blood. These agents have the effect of combining with the impurities, which rise to the surface, and are removed. The clarified syrup is then strained through a woollen cloth, whereby it is rendered limpid. It is next transferred to a boiler, where it is subjected to ebullition, until it is brought to a proper concentration, when it is allowed to cool in conical moulds, and to drain for the separation of the molasses. This last boiling requires to be continued so long, that the action of the fire and air frequently decomposes the sugar to such an extent, as to cause a loss of twenty-five per cent. in molasses. This disadvantage has caused the process above described to be very generally abandoned since the year 1812; and now, for the most part, the sugar refiners boil the syrup in shallow boilers, which are suspended in such a way as to admit of their being emptied with the greatest quickness, without putting out the fire. By this arrangement, ten minutes are a sufficient time for boiling, and thus any considerable decomposition of the sugar is avoided.

The process of refining has been still further improved by Messrs. Philip Taylor and Howard. The former introduced the improvement of heating the syrup with great rapidity by means of steam, made to pass through a series of tubes traversing the boiler; and the latter devised the plan of causing the syrup to boil under a diminished pressure, created by a suction pump, set in motion by a steam engine, while it was heated by steam, circulating round the boiler. In this way, the syrup was made to boil at a low temperature, and without contact with the air, the two conditions most favourable to the formation of crystallizable sugar.

After the syrup is sufficiently boiled by any of these methods, it is transferred into a large vessel to cool, and afterwards poured into unglazed earthenware moulds of a conical shape, with a hole in the apex, which is stopped with a plug of linen. The moulds are placed, with the apex downwards, above stone-ware pots, intended to receive the uncrystallizable syrup. While the mass is cooling it is stirred, to cause the sugar to granulate, and when it has completely concreted, the moulds are unstopped, to allow the syrup to drain off. This syrup constitutes *sugar house molasses*. To remove the remains of the coloured syrup, the operation called *claying* is performed. This consists in removing from the base of the cones, a layer of the sugar, about an inch thick, and replacing it with pure sugar in powder, which is covered with a mixture of pipe clay and water, of about the consistence of cream. The water gradually leaves the clay, dissolves the pure sugar, and percolates the mass as a pure syrup, removing in its progress the coloured syrup. When this is all removed, the loaf is taken out of the mould and placed in stoves to dry. It now constitutes *white* or *purified sugar*.

Latterly bullocks' blood has gone very much out of use, and animal charcoal has been substituted, in the proportion of from four to fourteen per cent. of the weight of the sugar. The sugar purified in this way is perfectly white. Sometimes the boiling is performed by means of heated whale oil, contained in serpentine tubes, which traverse the syrup, and into which the oil is drawn by a suction pump. This plan, first put in practice by an English refiner of the name of Daniel Wilson, affords the means of heating the syrup rapidly without the risk of burning it, and of withdrawing the heat in an instant, by stopping the action of the pump.

Of the several forms of sugar above indicated, as resulting from the various steps for its preparation, three only, *white* and *brown sugar*, and *molasses*, are officinal in the British and United States Pharmacopœias; and these are designated by the scientific names placed at the head of this article. The United States Pharmacopœia recognises refined sugar only, which it names *Saccharum;* the uses of brown sugar and molasses being replaced by the employment of a prepared syrup of known strength. (See *Syrupus.*) The three British Colleges admit both purified and brown sugar, and the Edinburgh and Dublin Colleges, molasses, under the appropriate name of *Syrupus Empyreumaticus*; but unfortnnately the United States Pharmacopœia calls *purified* sugar *Saccharum*, being the same name employed by the London College to denote the *unpurified*.

Commercial History. Sugar has been known from the earliest ages, and was originally obtained from Asia. About the period of the Crusades, the Venetians brought it to Europe; but at that time it was so scarce as to be exclusively used as a medicine. Upon the discovery of the Cape of Good Hope and the maritime route to the East Indies, the commerce in sugar passed into the hands of the Portuguese. Subsequently the cultivation o the cane was extended to Arabia, Egypt, Sicily, Spain, and the Canaries and finally, upon the discovery of the new world, to America, where it was carried on with the greatest success, and continues to be so up to the presen day. After this time, sugar became comparatively so cheap and abundant that, from being viewed as a medicine and costly luxury, it came into almos universal use among civilized nations, as an article of food. In America i is produced most abundantly in the West Indies, which supply the greate part of the consumption of Europe, little comparatively being brought from the Brazils or the East Indies. The consumption of the United States which in the year 1829 was estimated at one hundred and fifty millions pounds, is more than half supplied by Louisiana and some of the neighbouring States, the remainder being received principally from the West Indies. It is not unlikely, that before many years shall have passed, all th sugar consumed in the United States will be furnished by the sugar-growin States. Within a few years, our planters have introduced into Louisian the variety of cane called the Otaheite or ribbon cane, which is hardier an more productive than the common cane, and better suited to the climate our Southern States.

Properties and Varieties. Sugar, in a pure state, is a solid of a peculiar grateful taste, permanent in the air, phosporescent by friction, and of the sp. gr. 1.6. It dissolves readily in half its weight of cold water, and to almost an unlimited extent in boiling water. The solution, when thick and ropy, is called *syrup*, and forms, by spontaneous evaporation, white, semi-transparent crystals, having the shape of oblique four-sided prisms, and called *sugar-candy*. Sugar is nearly insoluble in absolute alcohol, but dissolves in four times its weight of boiling alcohol of the sp. gr. 0.83. Exposed to heat it swells, undergoes fusion, is decomposed, and exhales a peculiar odour, called *caromel.* Subjected to destructive distillation, it yields an acid water mixed with empyreumatic oil, and as gaseous products, a mixture of hydrogen, carburetted hydrogen, carbonic oxide, and carbonic acid; and there remains in the retort one-fourth of its weight of charcoal, which burns without residue. Dissolved in water and mixed with a ferment, it undergoes the vinous fermentation, and is converted into carbonic acid and alcohol. (See *Alcohol.*) By the action of strong sulphuric acid it is blackened and decomposed; and by a prolonged ebullition with the same acid in a dilute state, is converted into a sugar, identical with the sugar of grapes. Nitric acid converts it into oxalic acid. (See *Acidum Oxalicum.*) Sugar has the property of combining with some salifiable bases, as potassa, ammonia, lime, and protoxide of lead, and forming with them definite compounds called *saccharates*. It renders the fixed and volatile oils to a certain extent miscible with water, and forms with the latter a kind of combination, called in pharmacy *oleo-saccharum.* When in solution, it is not precipitated by subacetate of lead, a negative property by taking advantage of which it may be separated from most other organic principles.

Besides cane sugar, chemists distinguish four other kinds; namely, the sugars severally obtained from *grapes, manna, mushrooms*, and *liquorice.* (See *Manna* and *Glycyrrhiza.*) Maple and beet sugar are the same as that of the cane. The artificial sugars, obtained by the action of dilute sulphuric acid severally on starch and ligneous fibre, are identical with the sugar of grapes. Besides these varieties, there are several saccharine substances of animal origin, such as *honey, sugar of milk*, and *sugar of diabetes.* The three officinal forms of the saccharine principle, *white* and *brown sugar*, and *molasses*, are mere varieties of cane sugar, the two former in the crystalline, the latter in the uncrystallizable state.

Purified or *white sugar*, as obtained in the arts, is in concreted somewhat porous masses, consisting of an aggregate of small crystalline grains, and possessing the general properties of sugar, as already described. When pure it is brittle and pulverulent, perfectly white, inodorous, and possessed of the pure saccharine taste. It may be viewed as the type of the class of saccharine substances.

Unpurified or *brown sugar* is in the form of a coarse powder, more or less moist and sticky, consisting of shining crystalline grains, intermixed with lumps, having a brownish-yellow colour more or less deep, a sweet, cloying taste, and a heavy and peculiar smell. It differs very much in quality. The best sort is nearly dry, in large sparkling grains of a clear yellow colour, and possesses much less smell than the inferior kinds. It consists of the pure crystallizable sugar, combined with variable quantities of colouring and extractive matter.

Molasses is a black ropy liquid of a peculiar odour, and a sweet empyreumatic taste. When fermented it forms rum. It consists principally of uncrystallizable sugar.

Composition. Pure sugar from the cane consists, according to Prout, of one equiv. of hydrogen 1, one of carbon 6, and one of oxygen 8=15. The theory of its conversion, during the vinous fermentation, into carbonic acid and alcohol, has been explained under another head. (See *Alcohol.*) According to Berzelius, however, cane sugar is a hydrate, consisting of one equiv. of dry sugar and one of water. He founds this opinion on the fact that his analysis of dry saccharate of lead, gives for the combined sugar the same elements as for cane sugar, *minus* one equiv. of oxygen and one equiv. of hydrogen, that is, one equiv. of water.

Pharmaceutical Uses, &c. The uses of sugar as an aliment and condiment are numerous. It is nutritious, but, judging from the results of the experiments of Magendie, not capable of supporting life when taken exclusively as aliment, on account of the absence of nitrogen in its composition. It is a powerful antiseptic, and is beginning to be used for preserving meat and fish; for which purpose it possesses the advantage of acting in a much less quantity than is requisite of common salt, and of not altering the taste, nor impairing the nutritious qualities of the aliment. It was formerly supposed to be an antidote to the poisonous effects of copper, but this proves to be a mistake. (See *Cuprum.*)

In pharmacy, *sugar* is employed to render oils miscible with water, to cover the taste of medicines, to give them consistency, and to preserve them from change. Accordingly it enters into the composition of several infusions and mixtures, and of nearly all the syrups, confections, and troches. *Brown sugar* is used to form the London and Dublin compound pills of iron, and the Dublin and Edinburgh infusion of senna with tamarinds; and *molasses*, in preparing the Edinbrugh syrup of senna, and the Dublin compound pills of calomel, of colocynth, and of galbanum, and the electuary of senna. In the United States Pharmacopœia, in which the two latter forms of sugar are not officinal, their place is usually supplied by the use of syrup. B.

* * *

SAGAPENUM. *Lond., Ed., Dub.*

Sagapenum.

"*Plantæ nondum descriptæ Gummi-resina.*" *Lond.*

Sagapenum, *Fr.;* Sagapen, *Germ.;* Sagapeno, *Ital., Span.;* Sugbeenuj, *Arab.*

All that is known in relation to the source of this gum-resin, is that it is the concrete juice of a plant, probably belonging to the family of the Umbelliferæ, growing in Persia. The plant is conjectured to be a species of Ferula, and Willdenow supposes it to be the *F. Persica*, but without sufficient evidence. The drug is brought from Alexandria, Smyrna, and other ports of the Levant.

It is in irregular masses composed of soft agglutinated fragments, slightly translucent, of a brownish-yellow, olive, or reddish-yellow colour externally, paler internally, brittle, of a consistence somewhat resembling that of wax, and often mixed with impurities, especially with seeds more or less entire. It has an alliaceous odour, less disagreeable than that of assafetida, and a hot nauseous bitterish taste. It softens and becomes tenacious by the heat of the hand. The effect of time and exposure is to harden and render it darker. It is inflammable, burning with a white flame and much smoke, and leaving a light spongy charcoal. Pure alcohol and water dissolve it partially, diluted alcohol almost entirely. Distilled with water it affords a small quantity of volatile oil; and the water is strongly impregnated with its flavour. According to Pelletier, it contains in 100 parts 54.26 of resin, 31.94 of gum, 1.0 of bassorin, 0.60 of a peculiar substance, 0.40 of acidulous malate of lime, and 11.80 of volatile oil including loss. Brandes found 3.73 per cent of volatile oil. This is of a pale yellow colour, very fluid, lighter than water, and of a very disagreeable alliaceous odour.

Medical Properties and Uses. Sagapenum is a moderate stimulant, similar to assafetida in its properties, but much inferior, and usually considered as holding a middle station between that gum-resin and galbanum. It has been given as an emmenagogue and antispasmodic in amenorrhœa, hysteria, chlorosis, &c., but is now seldom used. The ancients were acquainted with it; and Dioscorides speaks of it as being derived from Media. The dose is from ten to thirty grains, and may be administered in pill or emulsion. Sagapenum is also considered discutient, and has been occasionally applied externally, in the form of a plaster, to indolent tumours.

Off. Prep. Confectio Rutæ, *Lond., Dub.;* Pilulæ Galbani Compositæ, *Lond.*

W.

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SAGO. *U.S.*

Sago.

"Cycas circinalis et Sagus Rumphii. Medulla præparata. *The prepared pith.*" *U.S.*

Sagou, *Fr.;* Sago, *Germ., Ital.;* Sagu, *Span.*

Numerous trees inhabiting the islands and coasts of the Indian Ocean, contain a farinaceous pith which is applied to the purposes of nutriment by the natives. Such are the *Sagus Rumphii*, *Sagus Ruffia*, and *Phœnix farinifera*, belonging to the family of the *Palms;* and the *Cycas circinalis*, *Cycas revoluta*, and *Zamia lanuginosa* belonging to the *Cycadeæ.* Of these the *Cycas circinalis*, *Cycas revoluta*, and *Sagus Rumphii*, have been severally indicated as the source of sago; and it is possible that they may all afford this peculiar form of farinaceous matter; but we are assured by Crawford, in his History of the Indian Archipelago, that the sago of commerce is derived exclusively from the *Metroxylon Sagu*, identical with the *Sagus Rumphii;* and this is at present the generally received opinion.

SAGUS. *Sex. Syst.* Monœcia Hexandria.—*Nat. Ord.* Palmæ.

Gen. Ch. Common spathe one-valved. *Spadix* branched. MALE. *Calyx* three-leaved. *Corolla* none. *Filaments* dilated. FEMALE. *Calyx* three-leaved, with two of the leaflets bifid. *Corolla* none. *Style* very short. *Stigma* simple. *Nut* tessellated-imbricated, one-seeded. *Willd.*

Sagus Rumphii. Willd. *Sp. Plant.* iv. 404; Loudon's *Encyc. of Plants*, p. 789. The *Sago palm* is one of the smallest trees of the family to which it belongs. Its extreme height seldom exceeds thirty feet. The trunk is proportionably very thick, quite erect, cylindrical, covered with the remains of the old leafstalks, and surrounded by a beautiful crown of foliage, consisting of numerous, very large, pinnate leaves, extending in every direction from the summit, and curving gracefully downwards. From the basis of the leaves proceed long divided and sub-divided flower and fruit-bearing spadices, the branches of which are smooth. The fruit is a roundish nut, covered with a chequered imbricated coat, and containing a single seed.

The tree is a native of the East India islands, growing abundantly in the Moluccas, Borneo, Celebes, and a part of New Guinea. It flourishes best in low and moist situations. Before attaining maturity, the stem consists of a shell usually about two inches thick, filled with an enormous volume of spongy medullary matter like that of elder. This is gradually absorbed after the appearance of fruit, and the stem ultimately becomes hollow. The greatest age of the tree is not more than thirty years. At the proper period of its growth, when the medullary matter is fully developed, and has not yet begun to diminish, the tree is felled, and the trunk cut into billets six or seven feet long, which are split in order to facilitate the extraction of the pith. This is obtained in the state of a coarse powder, which is mixed with water in a trough, having a sieve at the end. The water loaded with farina, passes through the sieve, and is received in convenient vessels, where it is allowed to stand till the insoluble matter has subsided. It is then strained off; and the farina which is left may be dried into a kind of meal, or moulded into whatever shape may be desired. For the consumption of the natives it is usually formed into cakes of various sizes, which are dried, and extensively sold in the islands. The commercial sago is prepared by forming the meal into a paste with water, and rubbing it into grains. It is produced in the greatest abundance in the Moluccas, but of the finest quality on the eastern coast of Sumatra. The Chinese of Malacca refine it so as to give the grains a fine pearly lustre. In this state it is called *pearl sago*, and is in great repute. It is said that not less than five or six hundred pounds of sago are procured from a single tree. (*Crawford.*)

Pearl sago is that which is now generally used. It is in small grains, about the size of a pin's head, hard, whitish or of a light brown colour, in some instances translucent, inodorous, and with little taste.

Common sago is in larger grains, of more unequal size, of a duller aspect, and frequently mixed with more or less of a dirty looking powder.

Sago is insoluble in cold water, but by long boiling unites with that liquid, becoming at first soft and transparent, and ultimately forming a gelatinous solution. Chemically considered, it has the characters of starch.

It is used exclusively as an article of diet, having no medicinal qualities which adapt it to the treatment of disease. Being nutritive, easily digestible, and wholly destitute of irritating properties, it is frequently employed in febrile cases, and in convalescence from acute disorders, in the place of richer and less innocent food. It is given in the liquid state, and in its preparation care should be taken to boil it long in water, and stir it diligently, in order that the grains may be thoroughly dissolved. Should any portion remain undissolved, it should be separated by straining, as it might offend a delicate stomach. A table-spoonful to the pint of water is sufficient for ordinary purposes. The solution may be seasoned with sugar and nutmeg, or with other spices where these are not contraindicated. W.

SALIX. *U.S. Secondary.*

Willow.

"Salix alba et aliæ. Cortex. *The bark.*"

Off. Syn. SALICIS CORTEX. Salix Caprea. Cortex. *Lond.;* SALICIS CAPREÆ CORTEX. *Ed.;* SALIX ALBA. SALIX FRAGILIS SALIX CAPREA. Cortex. *Dub.*

Ecorce de saule, *Fr.;* Weidenrinde, *Germ.;* Corteccia di salcio, *Ital.;* Corteza de sauc *Span.*

Salix. *Sex.Syst.* Diœcia Diandria.—*Nat. Ord.* Amentaceæ, *Juss.;* Salicineæ, *Richard, Lindley.*

Gen.Ch. Male. *Amentum* cylindrical. *Calyx* a scale. *Corolla* none. *Glands* of the base nectariferous. Female. *Amentum* cylindrical. *Calyx* a scale. *Corolla* none. *Style* two-cleft. *Capsule* one-celled, two-valved. *Seeds* downy. *Willd.*

This is a very extensive genus, comprising, according to Nuttall, not less than one hundred and thirty species, which, with very few exceptions, are natives of Europe and of the northern and temperate parts of North America. Though they are all probably possessed of similar medical properties, only three have been admitted to the rank of officinal plants by the British Colleges; viz. *S. alba*, *S. caprea*, and *S. fragilis*. Of these species, the *Salix alba* is the only one which has been introduced into this country, and is expressly recognised in the last edition of our Pharmacopœia. Many native species are in all probability equally active; but they have not been sufficiently tried in regular practice to admit of a positive decision in relation to them. The younger Michaux speaks of the *S. nigra* or *black willow*, as affording in its root a strong bitter used in the country as a preventive and cure of intermittents. In consequence of the pliability of the young branches or twigs, the willow is admirably adapted for the manufacture of baskets and other kinds of wicker-work, and several species, as well native as introduced, are employed for this purpose in the United States. The *S. Babylonica* or weeping willow is a favourite ornamental tree.

Salix alba. Willd. *Sp. Plant.* iv. 710; Smith, *Flor. Brit.* 1071. The common European or white willow is a tree twenty-five or thirty feet in height, with numerous round spreading branches, the younger of which are silky. The bark of the trunk is cracked and brown, that of the smaller branches smooth and greenish. The leaves are alternate, upon short petioles, lanceolate, pointed, acutely serrate with the lower serratures glandular, pubescent on both sides, and silky beneath. There are no stipules. The flowers appear at the same time with the leaves. The *amenta* are terminal, cylindrical, and elongated, with elliptical, lanceolate, brown, pubescent scales. The stamens are two in number, yellow, and somewhat longer than the scales; the style is short; the stigmas two-parted and thick. The capsule is nearly sessile, ovate, and smooth.

The white willow has been introduced into this country from Europe, and is now very common. It flowers in April and May; and the bark is easily separable throughout the summer.

That obtained from the branches rolls up when dried into the form of a quill, has a brown epidermis, is flexible, fibrous, and of difficult pulverization. Willow bark has a feebly aromatic odour, and a peculiar bitter astringent taste. It yields its active properties to water, with which it forms a reddish-brown decoction. Pelletier and Caventou found among its ingredients, tannin, resin, a yellow colouring matter, gum, and an acid. The proportion of tannin is so considerable that the bark has been used for tanning eather. A crystalline principle has recently been obtained from it, which, having the medical virtues of the willow, has received the name of *salicin.* When pure, it is in white, shining, slender crystals, very bitter to the taste, with the peculiar flavour of the bark. It is soluble in cold water, much more o in boiling water, soluble in alcohol, and insoluble in ether and the oil of urpentine. Uniting neither with acids nor salifiable bases, and containing no itrogen, it has no claims to rank among the vegetable alkalies. Concentrated ulphuric acid decomposes it, receiving from it an intense and permanent right red colour. The diluted acids dissolve it without change. The honour of its discovery is claimed by Buchner of Germany, and Fontana and Rigatelli of Italy; but M. Leroux of France deserves the credit of having first accurately investigated its properties. M. Braconnot procures it by adding subacetate of lead to a decoction of the bark, precipitating the excess of lead by sulphuric acid, evaporating the colourless liquid which remains, adding near the end of the process a little animal charcoal previously washed, and filtering the liquor while hot. Upon cooling it deposites the salicin in a crystalline form. (*Journ. de Chimie Medicale, Janv.* 1831.) Messrs. Fisher and Tyson of Baltimore recommend the following process, which they have tried with success. Willow bark is boiled with caustic lime in water, the decoction filtered, and sulphate of zinc added so long as it produces a precipitate. The liquid having been again filtered, is evaporated to the consistence of an extract, and the residue treated with alcohol. The tincture thus obtained, if carefully evaporated, yields crystals of salicin, which may be purified by washing with a saturated solution of the same principle in cold water. (*Journ. of the Phil. Col. Pharm.* iii. 214.) The *Salix helix* is the species which in France has been found most productive of salicin; but the *S. alba* and others also afford it. *M. Braconnot* has obtained it from various species of Populus, particularly the *P. tremula* or European aspen.

Medical Properties and Uses. The bark of the willow is tonic and astringent; and has been employed as a substitute for Peruvian bark, particularly in intermittent fever. It has recently attracted much attention from the asserted efficacy of salicin in the cure of this complaint. There seems to be no room to doubt, from the testimony of numerous practitioners in France, Italy, and Germany, that this principle has the property of arresting intermittents; though the ascription to it of equal efficacy with the sulphate of quinia was certainly premature. The bark may be employed in substance or decoction, in the same doses and with the same mode of preparation as cinchona. The dose of salicin is from two to eight grains, to be so repeated that from twenty to forty grains may be taken daily, or in the interval between the paroxysms of an intermittent. Magendie has seen fevers cut short in one day by three doses of six grains each. The decoction of willow has been found beneficial as an external application in foul and indolent ulcers.

W.

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SALVIÆ OFFICINALIS FOLIA. *Ed.*

Leaves of Sage.

Sauge, *Fr.;* Salbey, *Germ.;* Salvia, *Ital., Span.*

Salvia. *Sex. Syst.* Diandria Monogynia.—*Nat. Ord.* Labiatæ.

Gen. Ch. Corolla unequal. *Filaments* affixed transversely to a pedicel. *Willd.*

Salvia officinalis. Willd. *Sp. Plant.* i. 129; Woodv. *Med. Bot.* p. 35 t. 127. The common garden sage is a perennial plant, about two feet hig with a quadrangular, pubescent, branching, shrubby stem, furnished wi opposite, petiolate, ovate lanceolate, crenulate, wrinkled leaves, of a grayis green colour, sometimes tinged with red or purple. The flowers are blu variegated with white and purple; and are disposed on long terminal spik in distant whorls, each composed of few flowers, and accompanied wi ovate, acute, deciduous bractes. The calyx is tubular and striated, wi two lips, of which the upper has three acute teeth, the under two. T corolla is tubular, bilabiate, ringent, with the upper lip concave, the lower divided into three rounded lobes, of which the middle is the largest. The filaments are supported upon short pedicels, to which they are affixed transversely at their middle.

Sage grows spontaneously in the South of Europe, and is cultivated abundantly in our gardens. There are several varieties, differing in the size and colour of their flowers, but all possessed of the same medical properties. The flowering period is in June, at which time the plant should be cut, and dried in a shady place. The leaves are the officinal portion.

Both these and the flowering summits have a strong, fragrant odour, and a warm, bitterish, aromatic, somewhat astringent taste. They abound in a volatile oil, which may be obtained separate by distillation with water, and contains a considerable proportion of camphor. Sulphate of iron strikes a black colour with their infusion.

Medical Properties and Uses. Sage unites a slight degree of tonic power and astringency with the properties common to the aromatics. By the ancients it was very highly esteemed; but it is at present little used internally, except as a condiment. In the state of infusion it may be given in debilitated conditions of the stomach attended with flatulence, and is said to have been useful in checking the exhausting sweats of hectic fever. But its most usual application is as a gargle in inflammation of the throat and relaxation of the uvula. For this purpose it is usually employed in infusion with honey and alum, or vinegar. From twenty to thirty grains of the powdered leaves may be given for a dose. The infusion is prepared by macerating an ounce of the leaves in a pint of boiling water, of which two fluidounces may be administered at once. When intended to be used merely as a pleasant drink in febrile complaints, or to allay nausea, the maceration should continue but a very short time, so that all the bitterness of the leaves may not be extracted.

Two other species of Salvia—the *S. pratensis* and *S. Sclarea*—are ranked among the officinal plants in Europe. The latter, which is commonly called *clarry*, has been introduced into our gardens. Their medical properties are essentially the same as those of the common sage; but they are less agreeable, and are not much used. In Europe, the leaves of the *S. Sclarea* are said to be introduced into wine in order to impart to it a muscadel taste.

W.

SAMBUCUS. *U.S. Secondary.*

Elder Berries.

"Sambucus Canadensis. Baccæ. *The berries.*" *U. S.*

Sambucus. *Sex. Syst.* Pentandria Trigynia.—*Nat. Ord.* Caprifoliaceæ.

Gen. Ch. *Calyx* five-parted. *Corolla* five-cleft. *Berry* three-seeded. *Willd.*

Sambucus Canadensis. Willd. *Sp. Plant.* i. 1494. Our indigenous *common elder* is a shrub from six to ten feet high, with a branching stem, which is covered with a rough gray bark, and contains a large spongy pith. The small branches and the leafstalks are very smooth. The leaves are opposite, pinnate, sometimes bipinnate, and composed usually of three or four pairs of oblong oval, acuminate, smooth, shining, deep-green leaflets, the midribs of which are somewhat pubescent. The flowers are small, white, and disposed in loose cymes, having about five divisions. The berries are small, globular, and when ripe of a deep purple colour.

The shrub grows in low moist grounds, along fences, and on the borders of small streams, in all parts of the United States, from Canada to Carolina. It flowers from May to July, and ripens its berries early in the autumn. These are the only officinal portion, though other parts of the plant are employed in domestic practice, and have been found to answer the same purposes with the corresponding parts of the European elder, to which this species bears a very close affinity. (See *Sambuci Nigræ Flores, &c.*) W.

SAMBUCI NIGRÆ FLORES, BACCÆ, CORTEX. *Ed.*

Flowers, Berries, and Bark of Common European Elder.

Off. Syn. SAMBUCI FLORES. *Lond.;* SAMBUCUS NIGRA. Flores. Baccæ. Cortex interior. *Dub.*

Sureau, *Fr.;* Hollunder, *Germ.;* Sambuco, *Ital.;* Sauco, *Span.*

Sambucus. See SAMBUCUS.

Sambucus nigra. Willd. *Sp. Plant.* i. 1495; Woodv. *Med. Bot.* p. 596. t. 211. The common elder of Europe differs from the American most obviously in its size, which approaches to that of a small tree. The stem is much branched towards the top, and has a rough whitish bark. The leaves are pinnate, consisting usually of five oval, pointed, serrate leaflets, four of which are in opposite pairs, and the fifth terminal. The flowers are small, whitish, and in five-parted cymes. The berries are globular, and of a blackish-purple colour when ripe.

The flowers have a peculiar rather unpleasant odour, which is strong in their recent state, but becomes feeble by drying. Their taste is bitterish. They yield their active properties to water by infusion, and when distilled give over a small proportion of volatile oil, which on cooling assumes a butyraceous consistence. Water distilled from them contains an appreciable portion of ammonia. The berries are nearly inodorous, but have a sweetish acidulous taste, dependent on the saccharine matter and malic acid which they contain. Their expressed juice is susceptible of fermentation, and forms a vinous liquor used in the North of Europe. It is coloured violet by alkalies, and bright red by acids; and the colouring matter is precipitated blue by acetate of lead. The inner bark is without smell; its taste is at first sweetish, afterwards slightly bitter, acrid, and nauseous. Both water and alcohol extract its virtues, which are said to reside especially in the green layer between the liber and epidermis.

Medical Properties and Uses. The flowers are gently excitant and sudorific, but are seldom used except externally as a discutient in the form of poultice, fomentation, or ointment. The berries are diaphoretic and aperient; and their inspissated juice has enjoyed some reputation as a remedy in rheumatic, gouty, eruptive, and syphilitic affections. Its dose as an alterative diaphoretic is one or two drachms, as a laxative half an ounce or more. The inner bark is a hydragogue cathartic, acting also as an emetic in large doses. It has been employed in dropsy and as an alterative in various chronic diseases. One ounce may be boiled with two pints of water to a pint, and four fluidounces of the decoction given for a dose It is also sometimes used in vinous infusion. The leaves are not withou activity, and the young leaf-buds are said to be a violent and even unsafe purgative.

Off. Prep. Succus Spissatus Sambuci Nigræ, *Ed., Dub.;* Unguentum Sambuci, *Lond., Dub.* W.

SANGUINARIA. *U.S.*

Blood-root.

"Sanguinaria Canadensis. Radix. *The root.*" *U.S.*

SANGUINARIA. *Sex. Syst.* Polyandria Monogynia.—*Nat. Ord.* Papaveraceæ.

Gen. Ch. Calyx two-leaved. *Petals* eight. *Stigma* sessile, two-grooved. *Capsule* superior, oblong, one-celled, two-valved, apex attenuated. *Receptacles* two, filiform, marginal. *Nuttall.*

Sanguinaria Canadensis. Willd. *Sp. Plant.* ii. 1140; Bigelow, *Am. Med. Bot.* i. 75; Barton, *Med. Bot.* i. 31. The *blood-root*, or, as it is sometimes called, *puccoon*, is an herbaceous perennial plant. The root is horizontal, abrupt, often contorted, about as thick as the finger, two or three inches long, fleshy, of a reddish-brown colour on the outside, and brighter red within. It is furnished with numerous slender radicles, and makes offsets from the sides, which succeed the old plant. From the end of the root arise the scape and leafstalks, surrounded by the large sheaths of the bud. These spring up together, the folded leaf enveloping the flower-bud, and rolling back as the latter expands. The leaf, which stands upon a long channeled petiole, is reniform, somewhat heart-shaped, deeply lobed, smooth, yellowish-green on the upper surface, paler or glaucous on the under, and strongly marked by orange-coloured veins. The scape is erect, round and smooth, rising from six inches to a foot in height, and terminating in a single flower. The calyx is two-leaved and deciduous. The petals, varying from seven to fourteen, but usually about eight in number, are spreading, ovate, obtuse, concave, mostly white, but sometimes slightly tinged with rose or purple. The stamens are numerous, with yellow filaments shorter than the corolla, and orange oblong anthers. The germ is oblong and compressed, and supports a sessile, persistent stigma. The capsule is oblong, acute at both ends, two-valved, and contains numerous oval, reddish-brown seeds. The whole plant is pervaded by an orange-coloured sap, which flows from every part when broken; but is of the deepest colour in the root.

The blood-root is one of the earliest and most beautiful spring flowers of North America. It grows abundantly throughout the whole United States, delighting in rich loose soils, and shady situations, and flowering in March and April. After the fall of the flower, the leaves continue to increase in size, and by the middle of summer, have become so large as to give the plant an entirely different aspect. All parts of the plant are active, but the root only is officinal.

This, when dried, is in pieces from one to three inches long, from a quarter to half an inch or more in thickness, flattened, much wrinkled and twisted, often furnished with abrupt offsets and numerous short fibres, of a reddish-brown colour externally, with a spongy uneven fracture, the surface of which is at first bright orange, but becomes of a dull brown by long exposure. The colour of the powder is a brownish orange-red. Sanguinaria has a faint narcotic odour, and a bitterish very acrid taste, the pungency of which remains long in the mouth and fauces. It yields its virtues to water and alcohol. The late Dr. Dana of New York obtained from it a peculiar alkaline principle, denominated by him *sanguinarina*, upon which the acrimony, and perhaps the medical virtues of the root depend. It may be procured, according to Dana, by infusing the finely powdered root in hot water or diluted muriatic or acetic acid, precipitating with water of ammonia, collecting the precipitated matter, boiling it in water with pure animal charcoal, filtering off the water, exposing the residue left upon the filter to the action of alcohol, and finally evaporating the alcoholic solution. (*Ann. Lyc. of Nat. Hist. New York*, ii. 250.) Sanguinarina, thus obtained, is a white pearly substance, of an acrid taste, very sparingly soluble in water, soluble in ether, and very soluble in alcohol. With the acids it forms salts soluble in water, all of which have some shade of red, crimson, or scarlet, and form beautiful red solutions. They are acrid and pungent to the taste, particularly the muriate and acetate. From these facts it would appear, that the red colour and acrid properties of the blood-root may be owing to the presence of some native salt of sanguinarina, which is decomposed by ammonia in the process of separating the vegetable alkali.

The virtues of the root are said to be rapidly deteriorated by time.

Medical Properties and Uses. Sanguinaria is an acrid emetic, with stimulant and narcotic powers. In small doses it excites the stomach, and accelerates the circulation; more largely given, it produces nausea and consequent depression of the pulse; and in the full dose occasions active vomiting. The effects of an overdose are violent emesis, a burning sensation in the stomach, faintness, vertigo, dimness of vision, and alarming prostration. Snuffed up the nostrils it excites much irritation, attended with sneezing. Upon fungous surfaces it acts as an escharotic. It has been given in typhoid pneumonia, catarrh, pertussis, croup, phthisis pulmonalis, rheumatism, jaundice, hydrothorax, and some other affections, either as an emetic, nauseant, or alterative; and its virtues are highly praised by many judicious practitioners.

The dose with a view to its emetic operation is from ten to twenty grains, given in powder or pill. The latter form is preferable in consequence of the great irritation of throat produced by the powder when swallowed. For other purposes, the dose is from one to five grains, repeated more or less frequently according to the effect desired. The medicine is sometimes given in infusion or decoction, in the proportion of half an ounce to the pint. The emetic dose of this preparation is from half a fluidounce to a fluidounce. The tincture is officinal. An infusion in vinegar has been employed advantageously, as a local application, in obstinate cutaneous affections.

Off. Prep. Tinctura Sanguinariæ, *U.S.* W.

SANTALUM. *U.S.*

Red Saunders.

"Pterocarpus santalinus. Lignum. *The wood.*" *U.S.*

Off. Syn. PTEROCARPI LIGNUM. Pterocarpus santalinus. Lignum. *Lond.;* PTEROCARPI SANTALINI LIGNUM. *Ed.;* SANTALUM RUBRUM. PTEROCARPUS SANTALINUS. Lignum. *Dub.*

Santal rouge, *Fr.;* Santelholz, *Germ.*

PTEROCARPUS. *Sex. Syst.* Diadelphia Decandria.—*Nat. Ord.* Leguminosæ.

Gen. Ch. Calyx five-toothed. *Legume* falcated, leafy, varicose, girted by a wing, not gaping. *Seeds* solitary. *Willd.*

Pterocarpus santalinus. Willd. *Sp. Plant.* iii. 906; Woodv. *Med. Bot.* p. 430. t. 156. This is a large tree with alternate branches, and petiolate ernate leaves, each simple leaf being ovate, blunt, somewhat notched at the apex, entire, veined, smooth on the upper surface, and hoary beneath. The lowers are yellow, in axillary spikes, and have a papilionaceous corolla, of which the *vexillum* is obcordate, erect, somewhat reflexed at the sides, oothed, and waved, the *alæ* spreading with their edges apparently toothed, and the *carina* oblong, short, and somewhat inflated. The tree is a native of ndia, and attains the highest perfection in mountainous districts. Its wood s the true officinal *red saunders,* though there is reason to believe that the product of other trees is sold by the same name.

It comes in squared or angular billets, internally of a blood-red colour, ex-ernally brown from exposure to the air, compact, heavy, and of a fibrous exture. It is kept in the shops in the state of small chips, raspings, or coarse powder.

Red saunders has little smell or taste. It imparts a red colour to alcohol and ether, but not to water; and a test is thus afforded by which it may be listinguished from some other colouring woods. The colouring principle, which has been separated by Pelletier, and called by him *santalin,* is of a esinous character, scarcely soluble in cold water, more so in boiling water, very soluble in alcohol, ether, acetic acid, and alkaline solutions, but slightly n the fixed and volatile oils, with the exception of those of lavender and osemary, which readily dissolve it.

The wood has no medical virtues, and is employed solely for the purpose of imparting colour.

Off. Prep. Spiritus Lavandulæ Compositus, *U.S., Lond., Ed., Dub.;* Tinctura Cinchonæ Composita, *U.S.;* Tinctura Rhei et Sennæ, *U.S.*

W.

SAPO. *U.S.*

Soap.

"Sapo ex sodâ et oleo olivæ confectus. *Soap prepared from soda and live oil." U.S.*

Off. Syn. SAPO DURUS. *Lond., Ed., Dub.*

Savon blanc, *Fr.;* Oel-sodaseife, *Germ.;* Sapone duro, *Ital.;* Xabon; *Span.*

SAPO VULGARIS. *U.S.*

Common Soap.

"Sapo ex sodâ et oleo animali confectus. *Soap prepared from soda and nimal oil." U.S.*

Savon de suif, Savon de graisse, *Fr.;* Talgseife, *Germ.*

SAPO MOLLIS. *Lond., Ed., Dub.*

Soft Soap.

"Sapo ex oleo et potassâ confectus." *Lond.* *Soap prepared from oil and potassa.*

Savon mou, Savon à base de potasse, *Fr.;* Schmierseife, Kaliseife, *Germ.*

Soaps, in the most extended signification of the term, embrace all those compounds which result from the reaction of oils and fats on salifiable bases. During this reaction, the fatty bodies are said to undergo *saponification*, and are changed into three peculiar acids, the *margaric*, *oleic*, and *stearic*, which unite with the salifiable base, and into a sweet principle called *glycerine*, which remains behind. Soap, under this view of its nature, is really a saline compound, consisting of a mixture, in variable proportions, of the *margarate*, *oleate*, and *stearate* of some base. The glycerine is not saponifiable.

Soaps are arranged in two divisions, the soluble and insoluble. The soluble soaps are those formed with soda, potassa, and ammonia; the insoluble include those generated with other salifiable bases, whether earths or metallic oxides. It is the soluble soaps only which are detergent, and it is to these that the term *soap* is generally applied. On the other hand, the insoluble soaps, though not fit to be used in domestic economy, are some of them employed in pharmacy; as for example, the soap of the oxide of lead, or lead plaster, and the soap of lime. (See *Emplastrum Plumbi* and *Linimentum Calcis.*)

The consistency of the fixed alkaline soaps depends partly on the nature of the oleaginous matter employed, but principally on the alkali present; soda forming a hard, and potassa a soft soap, as correctly stated in the officinal definitions of the British Colleges. This difference depends upon the circumstance, that the stearate, margarate, and oleate of soda are firm and solid; while the corresponding salts of potassa, which are the constituents of soft soap, have a gelatinous consistency. The soap of soda is more or less hard, according as the stearate and margarate, or the oleate predominate in its composition. These variations in its constitution depend upon the nature of the oily matter. It has been explained elsewhere, (See *Adeps* and *Olea*,) that all the fixed oils, whether liquid or concrete, consist of two proximate constituents, called *stearin* and *elain;* the former being solid, the latter a thin oil. When these are separately saponified, the stearin is found to be converted principally into *stearic* and *margaric* acids, and the elain chiefly into *oleic* acid. Oily and fatty bodies, therefore, which are rich in stearin, such as tallow and olive oil, will form the hardest soda soap.

The officinal soaps, the names of which are placed at the head of this article, embrace three soluble varieties, namely, two soda soaps, made respectively with olive and animal oil; and one potassa soap, under the name of soft soap. The soap of ammonia, also a soluble soap, is described under another head. (See *Linimentum Ammoniæ.*)

Preparation. Olive oil soda soap is usually prepared as follows. Barilla is bruised, and mixed with about one-third of its weight of slaked lime, and a portion of cold water is added to the mixture. At the end of about twelve hours, the liquor is drawn off, and constitutes what is called the first lixivium Two other lixivia are then obtained, by separate portions of water, which serve to exhaust the alkali from the residuum, and constitute weaker solu tions than the first. The next step consists in boiling the alkaline solution with the oil, which is mixed with one-fifth of rapeseed oil, to prevent the resulting soap from crumbling when it is cut. The ebullition is performed in large iron boilers. The weakest lixivium is first put into the boiler, to which a little oil is added, and the mixture is boiled. The combination soon takes place, and portions of the weaker solutions and of the oil are successively added, until the latter is expended. The strong lixivium is now added in successive small portions, and by completing the saturation of the oil, forms perfect soap, which separates from the remaining liquor and floats on the surface. This liquor, though abundant, consists principally of certain salts, which render it no longer fit for saponification. The fire is now allowed to fall, and the liquor in question is drawn off by a pipe, so as to leave the soap nearly dry. Fresh portions of strong lixivium are now added, the fire is rekindled, and the addition of the alkaline solution is continued, until the operator is satisfied that the saturation is complete. The remaining liquor is again drawn off as at first, so as to allow the soap, which floats on the surface, to sink to the bottom of the boiler. The soap is now of a bluish-black colour, and contains about sixteen per cent. of water. The colour arises from a combination of oil with alumina and the hydrosulphate of iron, constituting a kind of alumino-ferruginous soap.

The soap, in the state above described, may be converted either into white soap, or marbled soap, at the pleasure of the operator. To convert it into the former, it is diluted by degrees with the weaker lixivia, and the mixture is subjected to a regulated heat, and allowed to remain at rest. The dark-coloured alumino-ferruginous soap gradually falls to the bottom, leaving the soda soap perfectly white. This is drained, and run into *frames*, where it cools and hardens, after which it is cut into cakes or bars. When the soap as first obtained is to be converted into marbled soap, it is thinned to a certain extent with the weak lixivia, and allowed to cool gradually. The colouring matter separates in veins, and while the soap is still traversed with these, it is run into the frames, allowed to harden, and cut into bars. To succeed in the process of *marbling*, the soap must have a medium consistency; for if too thin, the colouring matter would fall to the bottom, and if too thick, this matter would become uniformly diffused through the soap.

Soap of soda, made as above described with olive oil, is manufactured principally in France and Spain, where the olive abounds. It is this soap which is meant by the officinal names *Sapo* of the U.S. Pharmacopœia, and *Sapo Durus* of the British Colleges. The London College indicates that imported from Spain, as the officinal kind.

Common soap (Sapo Vulgaris, *U.S.*) is also a soda soap, but instead of olive, it contains animal oil. This soap corresponds with the white soap of northern European countries and the United States, and is formed usually from barilla and tallow. In Scotland, it is manufactured from kelp and tallow. It was introduced into the lists of the U.S. Pharmacopœia, as the only soap proper for making opodeldoc. (See *Linimentum Saponis Camphoratum.*) This soap is made by boiling the alkaline lixivia, obtained from the barilla or kelp and added in successive portions, with the melted tallow, until the saponification is complete; after which the soap is lifted out and put into the frames to consoldidate.

Soft soap (Sapo Mollis) is prepared on the same general principles as hard soap; potash being employed as the alkali, and a fatty matter, rich in elaïn, as the oil. The French soft soap is made with the seed oils, such as rape-seed, hemp-seed, &c.; the Scotch, with fish oil and tallow; and our own with refuse fat and grease. A ley of wood-ashes is the form of potash usually employed. In the fabrication of this soap there is this peculiarity, that the soap formed, continues, throughout the whole process, to be dissolved in the alkaline solution; whereas, on the contrary, in making a soda soap, it is necessary for the success of the process, that the soap should separate from this solution. On this view, soft soap is a soap of potassa completely dissolved in the solution of its alkali, which consequently is present in excess. Soft soap is sometimes made with a view to its conversion into soda or hard soap. This conversion is effected by the addition of common salt, which, by double decomposition, generates a soap of soda, and muriate of potassa in solution.

Besides the officinal soaps of the British and United States Pharmacopœias, the preparation of which is above described, there are many other varieties, more or less used for medicinal or economical purposes. The officinal soap of the French Codex, called *amygdaline soap of soda*, is formed from soda and fresh almond oil, and is directed to be kept for two months before being used. *Starkey's soap*, also officinal in the Codex, is prepared by uniting, by trituration, carbonate of potassa with oil of turpentine and Venice turpentine. *Eau de luce* (aqua luciæ) is a kind of liquid soap, formed by mixing together a tincture of oil of amber and balsam of Gilead, with water of ammonia. *Transparent soap* is prepared by saponifying kidney fat with soda free from foreign salts, drying the resulting soap, dissolving it in alcohol, filtering and evaporating the solution, and running it into moulds when sufficiently concentrated. This soap is yellow, or yellowish-brown, and preserves its transparency after desiccation. *Palm soap* is prepared from palm oil and soda. It has a yellowish colour, and an agreeable odour of violets derived from the oil. *Almond soap* is made by dissolving equal parts of soap of olive oil and tallow soap in almond milk, formed from bitter almonds and infusion of roses, to which a little hydrocyanic acid is sometimes added. *Soap balls* are prepared by dissolving soap in a small quantity of water, and then forming it into a mass of the proper consistence, by means of starch. *Common yellow soap*, used for domestic purposes, derives its peculiarities from an admixture of rosin and a little palm oil with the tallow employed; the oil being added to improve its colour.

All the varieties of soap, except a few of the fancy sort and the olive oil soaps, are manufactured in the United States. These latter, which are chiefly used for medicinal purposes, are imported in largest amount from France. The total importation of soap for 1832 amounted to nearly eight hundred thousand pounds. The domestic export for the same time reached to nearly six millions of pounds.

Properties. Soap, whatever may be its colour, has the same general properties. Its aspect and consistence are familiar to every one. Its smell is peculiar, and its taste slightly alkaline. It is somewhat heavier than water, and therefore sinks in that liquid. Exposed to heat it quickly fuses, swells up, and is decomposed. It dissolves in water, and more readily in hot than in cold; and acids added to the solution, combine with the alkali, and set free the oleaginous acids, which being diffused through the water, produce a milky appearance. Its decomposition is also determined by all metallic salts, which invariably give rise to insoluble soaps. Soap is soluble also in cold, and abundantly in boiling alcohol. When dissolved in this menstruum it constitutes the tincture of soap, which forms a very convenient test for discovering earthy salts in mineral waters. Its use as a detergent depends upon its power of rendering grease and other soiling substances soluble in water, and, therefore, susceptible of being removed by washing.

Olive oil soda soap is also a hard soap, and is presented under two principal varieties, white and marbled. Good *white soap* has a slight yellowish tinge. In thin slices it is translucent, and to the touch it is neither greasy nor slippery. It ought not to grow moist, but, on the contrary, become dry by exposure to the air; without, however, being covered with any saline efflorescence. This variety of soap contains about forty-five per cent. of water. *Marbled soap* is harder and more constant in its proportions than white soap. It contains but thirty per cent. of water; and it is out of the power of the manufacturer to increase this quantity; whereas in making white soap, the operator may augment the proportion of this liquid to an almost indefinite extent, the soap being whiter in proportion as the quantity of water is greater. Marbled soap is, therefore, more economical than white soap for all the purposes to which it is applicable. That variety of marbled soap, called *Castile* in the shops, has its blue and red veins produced, the former by the addition of sulphate of iron to a part of the alkaline ley, after the soap is fully boiled; the latter by stirring in red oxide of iron, when the soap is nearly completed. (*Thomson, Lond. Dispensatory.*)

Animal oil soda soap, the *Sapo Vulgaris* of the United States Parmacopœia, is a hard soap, of a white colour, inclining to yellow. It possesses the same general properties as the olive oil soda soap.

Soft soap, as made in this country, is in the form of a semi-fluid slippery mass, capable of being poured from one vessel to another, and of a dirty yellow colour. This soap always contains an excess of alkali, which causes it to act more powerfully as a detergent than hard soap. That which is made in France has a greenish colour and the consistence of soft ointment, and is made from potassa, and hemp-seed oil. Sometimes it is manufactured from the dregs of olive oil.

Adulterations. When soap is made to unite with an excess of water, it becomes unnaturally white. Sometimes pulverized lime, gypsum, or pipe-clay, is incorporated with it, with fraudulent intentions. An excess of water may be known by the rapid loss of weight which the soap suffers in a dry air; and the latter substances are detected by acting on the soap with alcohol, which leave them undissolved.

Incompatibles. Soap is decomposed by all the acids, earths, and earthy and metallic salts. The acids combine with the alkali, and set free the oil; the earths unite with the oily matter, and separate the alkali; while the salts mentioned give rise, by double decomposition, to an insoluble soap of their base, and a saline combination between their acid and the alkali of the soap. All hard waters, in consequence of their containing lime, decompose and curdle soap.

Composition. As has been already explained, soap consists of certain oleaginous acids,resulting from the saponification of fats and oils, united with an alkali. Several of them have been analyzed by able chemists, and present considerable variation in their composition. According to Braconnot, Marseilles soap, which is an olive oil white soap, consists of soda 10.24, oleic acid 59.20, stearic acid 9.20, and water 21.36=100; and according to Thenard, marbled soap is composed of soda 6, fatty acids 64, water 30=100. The proportion of water is particularly variable; ranging, in different specimens, from twenty-one to forty-five per cent.

Medical Properties. Soap possesses the properties of a laxative and antacid. It is seldom given alone, but frequently in combination with rhubarb, the astringency of which it has a tendency to correct. Thus combined, it is frequently administered in dyspepsia, attended with constipation and torpor of the hepatic system. As it is readily decomposed by the weakest acids, which combine with the alkali, it has proved useful in acidity of the stomach, and has been recommended as a remedy in the uric acid diathesis; but it possesses no power to dissolve calculi, as was once supposed. Externally, soap is a stimulating discutient, and as such has been used, by frictions, in sprains and bruises. Dr. A. T. Thomson has seen much benefit derived from rubbing the tumid bellies of children in mesenteric fever, morning and evening, with a strong lather of soap. In pharmacy, soap is frequently employed for the purpose of giving proper consistency to pills; but care must be taken not to associate it with a substance which may be decomposed by it. It is also an ingredient in some liniments and plasters. In toxicology it is used as a counterpoison for the mineral acids, and should be always resorted to in poisoning by these agents without a moment's delay, and its use continued, until magnesia, the more appropriate antidote, can be obtained. The mode of administration, in these cases, is to give a teacupful of a solution of soap, made by dissolving it in four times its weight of water, every three or four minutes, until the patient has taken as much as he can swallow. The dose of soap is from three grains to half a drachm, given in the form of pill.

Off. Prep. of Soap. Ceratum Saponis, *U.S., Lond.;* Emplastrum Saponis, *Lond., Ed., Dub.;* Extractum Colocynthidis Compositum, *U.S., Lond., Dub.;* Linimentum Saponis Compositum, *Lond.;* Pilulæ Aloës, *U.S., Ed.;* Pilulæ Aloës et Assafœtidæ, *U.S., Ed., Dub.;* Pilulæ Assafœtidæ, *U.S.;* Pilulæ Cambogiæ Compositæ, *Lond., Ed., Dub.;* Pilulæ Colocynthidis Compositæ, *Dub.;* Pilulæ Opii, *U. S.,* Pilulæ Saponis cum Opio, *Lond., Dub.;* Pilulæ Scillæ Compositæ, *Lond., Dub.;* Pilulæ Sub-Carbonatis Sodæ, *Ed.;* Tinctura Saponis Camphorata, *U. S., Ed., Dub.;* Tinctura Saponis et Opii, *Ed.*

Off. Prep. of Common Soap. Linimentum Saponis Camphoratum, *U.S.*

Soft Soap is not used in any officinal preparation.

B.

SARSAPARILLA. *U.S.*

Sarsaparilla.

"Smilax sarsaparilla, et aliæ. Radix. *The root.*" *U.S.*

Off. Syn. SARSAPARILLÆ RADIX. Smilax Sarsaparilla. Radix. *Lond.;* SMILACIS SARSAPARILLÆ RADIX. *Ed.;* SARSAPARILLA. SMILAX SARSAPARILLA. Radix. *Dub.*

Salsepareille, *Fr.;* Sarsaparille, *Germ.;* Salsapariglia, *Ital.;* Zarzaparrilla, *Span.*

Smilax. *Sex. Syst.* Diœcia Hexandria.—*Nat. Ord.* Asparagi, *Juss.;* Smilaceæ, *R. Brown, Lindley.*

Gen.Ch. Male. *Calyx* six-leaved. *Corolla* none. Female. *Calyx* six-leaved. *Corolla* none. *Styles* three. *Berry* three-celled. *Seeds* two. *Willd.*

Although the British and American Pharmacopœias, as well as most of those on the continent of Europe, recognise the root of the *Smilax Sarsaparilla* as officinal, it is very doubtful whether any of the drug as found in the shops is obtained from this species. The *S. Sarsaparilla* is a native of the United States, and its root would certainly be dug up and brought into the market, had it been found to possess the same properties with the imported medicine. It is not among the eleven species of *Smilax* described by Humboldt, Bonpland, and Kunth, who indicate the *S. officinalis, S. syphilitica,* and *S. Cumanensis,* especially the first, as the probable sources of the sarsaparilla exported from Mexico and the Spanish Main. In the present state of our knowledge on the subject, it is impossible to decide with certainty from what species the several commercial varieties of the drug are respectively derived. This much is highly probable, that they do not proceed from the same plant. Of the great number of species belonging to this genus, very few possess any useful medicinal power; and Hancock states that of the six or eight which he found growing in the woods of Guiana, only one presented in any degree the sensible properties of the genuine sarsaparilla, the rest being insipid and inert. The root of the *Smilax China*, a native of China and Japan, has been employed under the name of *China root* for similar purposes with the officinal sarsaparilla. As it occurs in commerce, it is in pieces from three to eight inches long and an inch or two thick, usually somewhat flattened, more or less knotty, often branched, of a brownish or grayish-brown colour externally, whitish or of a light flesh-colour internally, without odour, and of a taste flat at first, but afterwards very slightly bitterish and somewhat acrid like that of sarsaparilla. It is feeble as a medicine, and at present very little used. A root supposed to be that of the *Smilax aspera*, has been employed in India as a substitute for sarsaparilla. Parcels of it, imported into London, are described as consisting of long, tortuous, cylindrical, rugose roots, with the cortical portion resembling cork, and divided by furrows into moniliform rings. It has an aromatic odour and a bitter taste. (*Journ. of the Phil. Col. of Pharm.* vi. 202.)

Smilax Sarsaparilla. Willd. *Sp. Plant.* iv. 776; Woodv. *Med. Bot.* p. 161. t. 62. This plant is perennial, and like all of the same genus has a climbing or trailing stem, which in the present instance is long, slender, shrubby, angular, and beset with spines. The leaves are unarmed, ovate lanceolate, with about five nerves, somewhat glaucous beneath, and supported alternately upon footstalks, at the bases of which are long tendrils. The flowers usually stand three or four together upon a common peduncle, which is longer than the leafstalk. The name *sarsaparilla* is expressive of the character of the plant, being derived from two Spanish words which signify a small thorny vine.

S. officinalis. Humb. and Bonpl. *Plant. Æquinoct.* i. 271. In this species the stem is angular and prickly, and the leaves oblong oval, acuminate, cordiform, coriaceous, smooth, and furnished with five or seven nerves. According to Humboldt, it abounds on the river Magdalena, and is the *zarzaparilla* of the natives.

S. syphilitica. Humb. *Plant. Æquinoct.* This species has a round prickly stem, with scattered prickles, and very firm, oblong lanceolate, mucronate, three-nerved, coriaceous leaves. It grows in Venezuela and perhaps other parts of South America.

The medicinal species of Smilax grow in Mexico, Guatemala, and the warm latitudes of South America. The roots are very long and slender, and originate in a common head from which the stems of the plant rise. They are brought into the market from various sources, and are divided into several commercial varieties according to their place of collection or shipment.

The sarsaparilla most commonly used in this country is brought from the bay of *Honduras*, by which name it is known in commerce. It comes in bundles two or three feet long, composed of the roots folded lengthwise, and secured in a compact form by a few circular turns. These are packed in bales imperfectly covered with skins, each bale containing about one hundred pounds. The roots are usually connected at one extremity in large numbers in a common head, to which portions of the stems are also attached.

In some bundles are many small fibres either lying loose or still adhering to the roots.

The *Jamaica* or *red sarsaparilla* of foreign writers is not known by that name in the United States. As the island of Jamaica is said to be merely its channel of exportation to Europe, and as it is supposed to be originally from Honduras, it is probably confounded by our druggists with the Honduras sarsaparilla, from which it does not materially differ in properties. The reddish colour of its epidermis is its chief peculiarity.

Considerable quantities of the drug are imported from the Mexican ports of *Vera Cruz* and *Tampico*. It comes either in packages, like the Honduras, or in large, rather loose bundles, bound with cords or leather thongs, and usually containing the roots separately packed. These, as in the Honduras sarsaparilla, consist of a head or caudex with numerous long radicles, which, however, are somewhat smaller than in that variety, and have a thinner bark. They are often also much soiled with earth. The *Vera Cruz sarsaparilla* is not highly esteemed; but from the acrid taste which it possesses, it is probably not inferior in real virtues to the other kinds.

Another variety is the *Caracas sarsaparilla*, brought in large quantities from La Guayra. It is in oblong packages, of about one hundred pounds, surrounded with broad strips of hide, which are connected laterally with thongs of the same material, and leave much of the root exposed. The roots, as in the last variety, are separately packed, but more closely and with greater care. The radicles are often very amylaceous internally, in this respect resembling the following.

The *Brazilian*, or, as it is sometimes called in Europe, the *Lisbon sarsaparilla*, scarcely reaches the United States. Commanding a higher price in the European markets than in ours, it takes the former course. It grows in the country between the sources of the Orinoco, and the Rio Negro, a northern tributary of the Amazon, through which latter river it is conveyed to the Port of Para. It is celebrated throughout South America by the name of *sarsa of the Rio Negro*, and is considered as the most valuable variety of the drug. It is distinguished by the amylaceous character of its interior structure. Hence has probably arisen the value attached in Europe to sarsaparilla, from whatever source derived, which when broken exhibits a starch-like aspect. We are informed that our druggists find it profitable to export parcels of this character when they happen to reach our market. But the Brazilian drug, if really more efficient, must owe its superiority to some other cause than the abundance of starch which it contains.

Properties. The dried sarsaparilla roots are several feet in length, abou the thickness of a goose-quill, cylindrical, more or less wrinkled longitudinally, flexible, and composed of a thick exterior cortical portion coverec with a thin easily separable epidermis, of an inner layer of ligneous fibre and of a central pith. The epidermis is of various colours, generally, in th *Honduras* variety, of a dirty ash-colour, sometimes very dark, and ofte more or less deeply tinged with red. The cortical portion is in some specimens whitish, in others brown, and not unfrequently of a pink or rosy hue It is occasionally white, brittle, and almost powdery like starch. The wood part is usually very thin, and composed of longitudinal fibres, which allov the root to be split with facility through its whole length.

Sarsaparilla is in its ordinary state nearly or quite inodorous, but in decoction acquires a decided and peculiar smell. To the taste it is mucilag nous and very slightly bitter, and, when chewed for some time, produces disagreeable acrid impression which remains long in the mouth and fauces

The root is efficient in proportion as it possesses this acrimony, which is said by some authors to be confined to the cortical portion, while the ligneous fibre and medullary matter are insipid and inert. Hancock avers that all parts are equally acrid and efficacious. The truth is probably between the two extremes; and, as in most medicinal roots, it must be admitted that the bark is more powerful than the interior portions, while these are not wholly inactive. The virtues of the root are communicated to water cold or hot, but are impaired by long boiling. (See *Decoctum Sarsaparillæ.*) They are extracted also by diluted alcohol. It appears from the experiments of Hancock that the whole of the active principle is not extracted by water. He observes in his paper upon sarsaparilla published in the London Medico-Botanical Transactions, when speaking of the sarsaparilla from Para and the Rio Negro, "after exhausting half a pound of this sort by two digestions, boiling and pressure, I added to the dregs half a pint of proof spirit, and digested this with a gentle heat for a few hours in a close vessel, then affusing hot water to the amount of that taken off from the first boiling, and pressing again, I procured by the last operation about four pints of an infusion which possessed the acrid properties of the sarsa in a much higher degree even than that obtained by the first decoction with simple water." It appears that in South America it is the custom to prepare sarsaparilla by digestion in wine or spirit, or by infusion in water with additions which may produce the vinous fermentation, and thus add alcohol to the menstruum. The same result, as to the superior efficacy of alcohol as a solvent of the acrid principle of sarsaparilla, has been obtained by the French experimentalists.*

According to M. Thubeuf, sarsaparilla contains, 1. a peculiar crystalline substance, which is probably the active principle of the root, 2. a colouring substance, 3. resin, 4. starch, 5. lignin, 6. a thick, aromatic fixed oil, 7. a waxy substance, and 8. muriate and nitrate of potassa. The proportion of starch is large. The crystalline principle in which the virtues of sarsaparilla probably reside should be called *sarsaparillin.* It was first discovered by Dr. Palotta, who described it in 1824, under the name of *pariglin.* Subsequently, M. Folchi supposed that he had found another principle which he called *smilacin.* In 1831, M. Thubeuf announced the discovery of a new substance in sarsaparilla, which he named *salseparine*, from the French name of the root. Finally, Batka, a German chemist, towards the end of 1833, published an account of a principle which he had discovered in the root, and which, under the impression that it possessed acid properties, he called *parillinic acid.* M. Poggiale, however, has recently shown that these substances are identical, and differ only in the processes by which they were procured. The process of M. Thubeuf, which is decidedly preferable to he others, is the following. The root is treated with hot alcohol till deprived of taste. The tincture thus obtained is submitted to distillation and even-eighths of the alcohol drawn off. The remainder is treated with nimal charcoal, and filtered at the end of twenty-four or forty-eight hours. The sarsaparillin is deposited in the form of a granular powder. This s dissolved in a fresh portion of alcohol and crystallized. The alcoholic nother liquors may be deprived of that portion of the principle which they etain by evaporating to dryness, dissolving the product in water, filtering, gain evaporating to dryness, redissolving in alcohol, and crystallizing. *Sarsaparillin* is white, inodorous, almost tasteless in the solid state, but of bitter, acrid, nauseous taste when dissolved in alcohol or water. It is very slightly soluble in cold water, but is more readily dissolved by boiling water which deposites it on cooling. It is very soluble in alcohol, especially at a boiling temperature. Ether and the volatile oils also dissolve it. Water which holds it in solution has the property of frothing very much by agitation. The solutions of sarsaparillin, are without either acid or alkaline reaction. Batka erred in considering it an acid. M. Poggiale found it both in the cortical and medullary part of the root, but most largely in the former. Palotta gave it internally in doses varying from two to thirteen grains, and found it to produce nausea and to diminish the force of the circulation. It is probably the principle upon which sarsaparilla depends chiefly, if not exclusively, for its remedial powers; but this opinion needs the support of further observation before it can be admitted as an established fact. (*Journ. de Pharm.* xx. 553 and 679.)

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* See a paper by M. Soubeiran, Journ. de Pharm. tom. xvi. p. 38. an. 1830.

The sarsaparilla of the shops is very apt to be nearly if not quite inert, either from age, or from having been obtained from an inferior species of Smilax. This inequality of the medicine, together with the improper modes of preparing it which have been long in vogue, have probably contributed to its variable reputation. The only criterion of good sarsaparilla which can be relied on is the taste. If it leave a decidedly acrid impression in the mouth after having been chewed for a short time, it may be considered efficient; if otherwise, it is probably inert.

Medical Properties and Uses. Few medicines have undergone greater changes of reputation. About the middle of the sixteenth century it was introduced into Europe as a remedy for the venereal complaint, in the treatment of which it had been found very useful in the recent Spanish settlements in the West Indies. After a time it fell into disrepute, and was little employed till nearly a century ago, when it was again brought into notice by Sir William Fordyce and others, as a useful adjuvant and corrigent of mercury in lues venerea. Since that period very different opinions have been entertained of its efficacy. Some, among whom was Dr. Cullen, considered it wholly inert; others, on the contrary, have had the most unbounded confidence in its powers. The probable cause of much of this discrepancy has been already mentioned. Experience, both among regular practitioners and empyrics, would seem to have placed its efficiency beyond reasonable doubt; and at this moment its reputation is probably as high as at any former period. Its most extensive and useful application is to the treatment of secondary syphilis and syphiloid diseases, and that shattered state of the system which sometimes follows the imprudent use of mercury in these affections. It is also employed, though with less obvious benefit, in chronic rheumatism, scrofulous affections, certain cutaneous diseases, and other depraved conditions of the general health to which the physician may find it difficult to apply a name. Its mode of action is less evident than its ultimate effects. It is said to increase the secretion of perspiration and urine; but allowing it to possess this power, the amount of effect is too trifling to explain its influence over disease; and the diaphoretic and diuretic action which it appears to evince, may perhaps be as justly ascribed to the medicines with which it is generally associated, or the liquid in which it is exhibited. In this ignorance of its precise *modus operandi* we may call it an alterative, as we call all those medicines which change existing morbid actions, without an obvious influence over any of the functions.

Sarsaparilla may be given in powder in the dose of half a drachm or a drachm three or four times a day; but it is more conveniently administered in the form of infusion, decoction, syrup, or extract. (*See the several offi-*

cinal preparations in Part II.) A beer made by fermenting an infusion of the drug with molasses, is said to be a popular remedy in South America.*

Off. Prep. Decoctum Sarsaparillæ, *Lond.*, *Dub.*, *Ed.;* Decoctum Sarsaparillæ Compositum, *U. S.*, *Lond.*, *Dub.;* Extractum Sarsaparillæ, *Lond.*, *Dub.;* Extractum Sarsaparillæ Fluidum, *Dub.;* Infusum Sarsaparillæ Compositum, *Dub.;* Syrupus Sarsaparillæ, *U. S.*, *Lond.*, *Dub.* W.

SASSAFRAS MEDULLA. *U.S.*

Sassafras Pith.

"Laurus sassafras. Stipitum medulla. *The pith of the stems.*" *U.S.*

SASSAFRAS RADICIS CORTEX. *U.S.*

Bark of Sassafras Root.

"Laurus sassafras. Radicis cortex. *The bark of the root.*" *U.S.*

Off. Syn. SASSAFRAS LIGNUM ET RADIX. Laurus Sassafras. *Lignum et Radix. Lond.;* LAURI SASSAFRAS LIGNUM. LAURI SASSAFRAS RADIX. *Ed.;* SASSAFRAS. LAURUS SASSAFRAS. Lignum. Radix. *Dub.*

Sassafras, *Fr.*, *Germ.;* Sassafras, Sassafrasso, *Ital.;* Sasafras, *Span.*

Laurus. See CAMPHORA.

Laurus Sassafras. Willd. *Sp. Plant.* ii. 485; Bigelow, *Am. Med. Bot.* ii. 142; Michaux, *N. Am. Sylv.* ii. 144. This is an indigenous tree of middling size; rising in favourable situations from thirty to fifty feet in height, with a trunk about a foot in diameter. In the Southern States it is sometimes larger, and in the northern parts of New England is little more than a shrub. The bark which covers the stem and large branches is rough, deeply furrowed, and grayish; that of the extreme branches or twigs is smooth and beautifully green. The leaves, which are alternate, petiolate, and downy when young, vary much in their form and size even upon the same tree. Some are oval and entire, others have a lobe on one side; but the greater umber are three-lobed. Their mean length is four or five inches. The lowers, which are frequently diœcious, are small, of a pale yellowish-green olour, and disposed in racemes which spring from the branches below the eaves, and have linear bractes at their base. The corolla is divided into six blong segments. The male flowers have nine stamens; the hermaphrodite, vhich are on a different plant, have only six, with a simple style. The fruit s an oval drupe, about as large as a pea, of a deep blue colour when ripe, and upported on a red pedicel, which enlarges at the extremity into a cup for its eception.

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* The following is a formula recommended by Hancock. "Take of Rio Negro sarsa, ruised, 2℔; bark of guaiac, powdered. 8 oz.; raspings of guaiac wood, anise seeds, nd liquorice root, each 4 oz.; mezereon, *bark of the root*, 2 oz.; treacle [molasses] 2℔; nd a dozen bruised cloves; pour upon these ingredients about four gallons of boiling waer, and shake the vessel thrice a day. When a fermentation has well begun, it is fit for se, and may be taken in the dose of a small tumblerful twice or thrice a day." This ormula is worthy of attention; but the bark of guaiacum, which is not kept in the shops, ight be omitted without materially affecting the virtues of the preparation.

The sassafras is common throughout the United States, and extends into Mexico. It is said also to grow in Brazil and Cochin-china. In this country it is found both in woods and open places, and is apt to spring up in the neighbourhood of cultivation, and in neglected or abandoned fields. In Pennsylvania and New York it blooms in the beginning of May; but much earlier at the South. The fresh flowers have a slightly fragrant odour, and almost all parts of the plant are more or less aromatic. The wood and root are directed by the British Pharmacopœias, the bark of the root, and the pith of the twigs or extreme branches, by that of the United States. The wood is porous, light, fragile, whitish in the young tree, reddish in the old, and but feebly endowed with aromatic properties. It is sent to Europe in billets invested with the bark; but is not employed in this country. The root is more commonly exported, and is the part chiefly used in British pharmacy. It consists of a brownish-white wood, covered with a spongy bark divisible into layers. The latter portion is by far the most active, and is usually kept in our shops in a separate state.

1. *Sassafras Pith.* This is in slender cylindrical pieces, very light and spongy, with a mucilaginous taste, having in a slight degree the characteristic flavour of the sassafras. It abounds in a gummy matter which it readily imparts to water, forming a limpid mucilage, which, though ropy and viscid, has much less tenacity than that of gum Arabic, and will not answer as a substitute in the suspension of insoluble substances. It differs also from solutions of ordinary gum, in remaining perfectly limpid when added to alcohol. This mucilage is much employed as a mild and soothing application in inflammation of the eyes; and forms a pleasant and useful drink in dysenteric, catarrhal, and nephritic diseases. It may be prepared by adding a drachm of the pith to a pint of boiling water.

2. *Bark of Sassafras Root.* As found in the shops, this is usually in small irregular fragments, sometimes invested with a brownish epidermis, sometimes partially or wholly freed from it, of a reddish or rusty cinnamon hue, very brittle, and presenting when freshly broken a lighter colour than that of the exposed surfaces. Its odour is highly fragrant, its taste sweetish, and gratefully aromatic. These properties are extracted by water and alcohol. They reside in a volatile oil which may be obtained separate by distillation with water. (See *Oleum Sassafras.*)

Medical Properties and Uses. The bark of sassafras root is stimulant, and perhaps diaphoretic, though its possession of any peculiar tendency to the skin, independently of its mere excitant property, is quite doubtful. It is used almost exclusively as an adjuvant to other more efficient medicines, the flavour of which it improves, while it renders them more cordial to the stomach. The complaints for which it has been particularly recommended, are chronic rheumatism, cutaneous eruptions, and scorbutic and syphiloid affections. As a remedy in lues venerea, in which it formerly had a high reputation, it is now universally considered as in itself wholly inefficient. It is most conveniently administered in the form of infusion. The oil may also be given. As the active principle is volatile, the decoction and extract are useless preparations.

Off. Prep. Aqua Calcis Composita, *Dub.;* Decoctum Guaiaci Compositum, *Ed.*, *Dub.;* Decoctum Sarsaparillæ Compositum, *U.S.*, *Lond.*, *Dub.;* Oleum Sassafras, *U.S.*, *Lond.*, *Ed.*, *Dub.*

W.

SCAMMONIUM. *U.S.*

Scammony.

"Convolvulus scammonia. Radicis succus concretus. *The concrete juice of the root.*" *U.S.*

Off. Syn. SCAMMONEÆ GUMMI-RESINA. Convolvulus Scammonea. Gummi-resina. *Lond.;* CONVOLVULI SCAMMONIÆ GUMMI-RESINA. *Ed.;* SCAMMONIUM. CONVOLVULUS SCAMMONIA. Gummi-resina. *Dub.*

Scammonèe, *Fr.;* Scammonium, *Germ.;* Scamonea, *Ital.;* Escamonea, *Span.*

CONVOLVULUS. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Convolvulaceæ.

Gen. Ch. Corolla bell-shaped, plaited. *Stigmas* two. *Capsule* two-celled, cells two-seeded. *Willd.*

Convolvulus Scammonia. Willd. *Sp. Plant.* i. 845; Woodv. *Med. Bot.* p. 243. t. 86. This species of Convolvulus has a perennial, tapering root, from three to four feet long, from nine to twelve inches in circumference, branching towards its lower extremity, covered with a light gray bark, and containing a milky juice. The stems are numerous, slender, and twining, extending sometimes to the distance of fifteen or twenty feet upon the ground or on neighbouring plants, aud furnished with smooth, bright green, arrow-shaped leaves, which stand alternately upon long footstalks. The flowers are placed in pairs, or three together upon the pedicels, which are round, axillary, solitary, and of nearly twice the length of the leaf.

The plant is a native of Syria, and the neighbouring countries. No part is medicinal except the root, which when dried, was found by Dr. Russel to be a mild cathartic. Scammony is the concrete juice of the fresh root, and is collected, according to Russel, in the following manner. In the month of June, the earth is cleared away from about the root, the top of which is cut off obliquely about two inches from the origin of the stems. The milky juice which exudes is collected in shells or other convenient receptacle, placed at the most depending part of the cut surface. A few drachms only are collected from each root. The juice from several plants is put into any convenient vessel, and concretes by time. In this state it constitutes genuine scammony, but is very seldom exported. It is generally prepared for the market by admixture, while it is yet soft, with the expressed juice of the stalks and leaves, with wheat flour, ashes, fine sand, &c.; and there is reason to believe that scammony sometimes consists wholly or in great part of the expressed juice of the root evaporated to dryness by exposure to the sun, or by artificial heat. The drug produced in Syria is called *Aleppo scammony*, from the place whence it is sent out of the country. There is another variety called *Smyrna scammony*, which is of uncertain origin, but supposed by some to be derived from the *Periploca Scammone*, and named from its place of export. In the South of France, a substance prepared from the expressed juice of the *Cynanchum Monspeliacum*, is sold by the name of *Montpellier scammony*, and is said to be brought into this country from Marseilles. Each of these varieties deserves a separate notice.

1. *Aleppo scammony.* This seldom or never reaches us in its purest state. It is described as in small masses, often porous, sometimes uniform, of a reddish or whitish-gray colour, breaking with a dull waxy fracture, forming when rubbed with the saliva a greenish-yellow emulsion, and pos-

sessing a strong disagreeable odour. The *Aleppo Scammony* brought to our market is contained in drums, in large irregular rather heavy masses, breaking with a faintly shining fracture, and exhibiting when broken a structure generally somewhat porous, sometimes cavernous, occasionally almost compact. The colour externally is usually a dark ash or olive; internally it is lighter and sometimes slightly tinged with yellow, but speedily deepens on exposure. The small fragments are somewhat translucent at the edges. The mass is easily pulverized, and yields a light gray powder. It imparts to water with which it is triturated a greenish milky appearance. The smell is rather disagreeable, but said to resemble that of old cheese made from ewe's milk. The taste is bitterish and slightly acrid.

2. *Smyrna scammony.* This is in flat cakes, darker, more compact, heavier, and harder than the preceding variety, less easily pulverized, of a dull and earthy fracture, a bitter acrid taste, and an odour which though disagreeable is different from that of genuine scammony. Its watery solution is opaque and of a dirty white colour. It is much inferior to Aleppo scammony; but is scarcely known as a distinct variety in our market. Under the name, however, of *Smyrna scammony*, a substance is found in some of our drug stores, said to be imported from Marseilles, which is evidently factitious, and may be considered as nearly or altogether worthless. It is in circular cakes or fragments of such cakes, rather more than half an inch thick, very light, almost black externally, penetrated with small holes as if worm eaten, and when broken exhibiting an irregular cellular, spongy texture.

3. The *Montpellier scammony* is black, hard, compact, and when rubbed with the moistened finger, becomes dark gray, unctuous, and tenacious. Its smell is weak and disagreeable, and its taste nauseous. We are not aware that it is imported; but as scammony is sometimes brought from the South of France, our druggists should be on their guard against it. It is said to be more irritating and less purgative than the Aleppo scammony, which it is sometimes employed to adulterate.

Scammony is ranked among the gum-resins. It is partially dissolved by water, more largely by alcohol, and entirely, with the exception of impurities, by diluted alcohol. Its chief constituent is resin, which constitutes more than two-thirds of the weight of Aleppo scammony. Bouillon-Lagrange and Vogel obtained from 100 parts of *Aleppo scammony* 60 of resin, 3 of gum, 2 of extractive, and 35 of insoluble matter; from the same quantity of *Smyrna scammony* 29 parts of resin, 8 of gum, 5 of extractive, and 58 of vegetable remains and earthy substances.

Medical Properties and Uses. Scammony is an energetic cathartic, apt to occasion griping, and sometimes operating with harshness. It was known to the ancient Greek physicians, and was much employed by the Arabians, who not only gave it as a purgative, but also applied it externally for the cure of various cutaneous diseases. It may be used in all cases of torpid bowels, when a powerful impression is desired; but on account of its occasional violence is seldom administered, except in combination with other cathartics, the action of which it promotes, while its own harshness is mitigated. It should be given in emulsion with mucilage, sugar, almonds, liquorice or other demulcent; and its disposition to gripe may be counteracted by the addition of an aromatic. The dose is from five to ten grains.

Off. Prep. Confectio Scammonii, *U.S., Lond., Dub.;* Extract. Colocynthidis Comp., *U.S., Lond.;* Pilulæ Catharticæ Comp., *U.S.;* Pilulæ Colocynthidis Comp., *Dub.;* Pulvis Scammonii Comp., *Lond., Dub., Ed.;* Pulvis Sennæ Comp., *Lond.*

W.

SCILLA. *U.S.*

Squill.

"Scilla maritima. Bulbus. *The bulb.*" *U.S.*

Off. Syn. SCILLÆ RADIX. Scilla maritima. Radix. *Lond.;* SCILLÆ MARITIMÆ RADIX. *Ed.;* SCILLA MARITIMA. Bulbus. *Dub.*

Scille, *Fr.;* Meerzwiebel, *Germ.;* Scilla, *Ital.;* Cebolla albarrana, *Span.*

Scilla. *Sex. Syst.* Hexandria Monogynia.—*Nat. Ord.* Asphodeleæ.

Gen. Ch. *Corolla* six-petaled, spreading, deciduous. *Filaments* thread-like. *Willd.*

Scilla maritima. Willd. *Sp. Plant.* ii. 125; Woodv. *Med. Bot.* p. 745. t. 255. This is a perennial plant, with fibrous roots proceeding from the bottom of a large bulb, which sends forth several long, lanceolate, pointed, somewhat undulated, shining, deep-green leaves. From the midst of the leaves a round, smooth, succulent flower-stem rises, from one to three feet high, terminating in a long, close spike of whitish flowers. These are destitute of calyx, and stand on purplish peduncles, at the base of each of which is a linear, twisted, deciduous floral leaf.

The squill grows on the seacoast of Spain, France, Italy, Greece, and the other countries bordering on the Mediterranean. The bulb is the officinal portion. It is generally dried for use; but it is sometimes imported into this country in the recent state, packed in sand.

Properties. The fresh bulb is pear-shaped, usually larger than a man's fist, sometimes as large as the head of a child, and consisting of fleshy scales, attenuated at their edges, closely applied over each other, and invested by exterior scales so thin and dry as to appear to constitute a membranous coat. In the variety generally employed, this exterior coating is of a deep reddish-brown colour, and the inner scales have a whitish rosy or very light pink epidermis, with a yellowish-white parenchyma. In another variety the whole bulb is white. They do not differ in their medicinal virtues. The bulb abounds in a viscid, very acrid juice, which causes it to inflame and even excoriate the skin when much handled. By drying, this acrimony is very much diminished, with little loss of medicinal power. The bulb loses about four-fifths of its weight in the process. Vogel found 100 parts of fresh squill to be reduced to 18 by desiccation. The process is somewhat difficult, in consequence of the abundance and viscid character of the juice. The bulb is cut into thin transverse slices, and the pieces dried separately by artificial or solar heat. The outer and central scales are rejected, the former being dry and destitute of the active principle, the latter too fleshy and mucilaginous. The British Colleges give directions in relation to the drying of squill; and the Dublin College orders it to be reduced to powder, and kept in phials with ground stoppers.

Dried squill, as found in our shops, is in irregular oblong pieces, often more or less contorted, of a dull yellowish-white colour with a reddish or rosy tint, sometimes entirely white, slightly diaphanous, brittle and pulverizable when perfectly dry, but generally flexible from the presence of moisture, for which they have a great affinity. Occasionally a parcel will be found consisting of vertical slices, some of which adhere together at their base. The odour is very feeble, the taste bitter, nauseous, and acrid.

The virtues of squill are extracted by water, alcohol, and vinegar. According to Vogel, it contains a peculiar very bitter principle named by him *scillitin*, gum, tannin, traces of citrate of lime and saccharine matter, lignin, and an acrid principle which he was unable to isolate. Water distilled from it had neither taste nor smell, and was drank by Vogel to the amount of six ounces without producing any effect. From the experiments of Duncan and Buchner it appears, that tannin, if it exists in squill, is in very small proportion. The *scillitin* of Vogel is soluble in water, alcohol, and vinegar; but it is considered by M. Tilloy of Dijon, whose analysis is more recent, as a compound of the proper active principle of squill with gum and uncrystallizable sugar. The *scillitin* obtained by the latter experimenter, was insoluble in water and in dilute acids, soluble in alcohol, exceedingly acrid and bitter to the taste, and very powerful in its influence on the animal system. A single grain produced the death of a strong dog. The following is the process of M. Tilloy. Dried squill is macerated in alcohol of 33° Baumé, the resulting tincture evaporated to the consistence of syrup, and the extract treated with alcohol of 35°. The alcoholic solution is evaporated, and the residue treated first with ether and subsequently with water. The aqueous solution, filtered and evaporated, yields a substance analogous to the scillitin of Vogel. To obtain the principle pure, the aqueous solution is treated with animal charcoal before evaporation. The matter obtained is dissolved in alcohol, ether is added to precipitate the sugar, and the active principle remains in the mixed liquor, from which it may be obtained by evaporation. According to M. Tilloy, this proceeding should be repeated several times. (*Dict. des Drogues.*) M. Chevallier thinks that the active principle of squill has not yet been entirely isolated.

When kept in a dry place, squill retains its virtues for a long time; but if exposed to moisture, it soon becomes mouldy.

Medical Properties and Uses. Squill is expectorant, diuretic, and in large doses emetic and purgative. In overdoses it has been known to occasion hypercatharsis, strangury, bloody urine, and fatal inflammation of the stomach and bowels. The Greek physicians employed it as a medicine; and it has retained to the present period a deserved popularity. As an expectorant, it is used both in cases of deficient and of superabundant secretion from the bronchial mucous membrane, in the former case usually combined with tartar emetic or ipecacuanha, in the latter frequently with the stimulant expectorants. In both instances, it operates by stimulating the vessels of the lungs; and where the inflammatory action in this organ is considerable, as in pneumonia and severe catarrh, the use of squill should be preceded by the lancet. In dropsical diseases it is very much employed, especially in connexion with calomel, which is supposed to excite the absorbents, while the squill increases the secretory action of the kidneys. In these complaints also it is thought to succeed best in the absence of general inflammatory excitement. On account of its great uncertainty and occasional harshness as an emetic, it is very seldom prescribed, except in infantile croup or catarrh, in which it is usually given in the form of syrup or oxymel. When given in substance, it is most conveniently administered in the form of pill. The dose, as a diuretic or expectorant, is one grain, repeated two or three times a day, and gradually increased till it produces slight nausea, or evinces its action upon the kidneys or lungs. From six to twelve grains will generally vomit.

Off. Prep. Acetum Scillæ, *U. S.*, *Lond.*, *Ed.*, *Dub.;* Mel Scillæ Compositum, *U.S.;* Oxymel Scillæ, *U.S.*, *Lond.*, *Dub.;* Pilulæ Scillæ Compositæ, *Lond.*, *Ed.*; *Dub.;* Pulvis Scillæ; *Ed.*, *Dub.;* Syrupus Scillæ, *U.S.* *Ed.;* Tinctura Scillæ, *U. S.*, *Lond.*, *Ed.*, *Dub.*

W.

SCROPHULARIA NODOSA. Folia. *Dub.*

Figwort Leaves.

Scrophulaire noueuse, *Fr.;* Braunwurzel, *Germ.;* Scrofolaria nodosa, *Ital.;* Escrofularia, *Span.*

Scrophularia. *Sex. Syst.* Didynamia Angiospermia.—*Nat. Ord.* Scrophularineæ.

Gen. Ch. *Calyx* five-cleft. *Corolla* subglobular, resupine. *Capsule* two-celled. *Willd.*

Scrophularia nodosa. Willd. *Sp. Plant.* iii. 270; Smith, *Flor. Brit.* 663. The root of the *knotty rooted figwort* is perennial, tuberous, and knotty; the stem is herbaceous, erect, quadrangular, smooth, branching, and from two to three feet high; the leaves are opposite, petiolate, ovate cordate, pointed, sharply toothed, veined, and of a deep-green colour; the flowers are small, dark purple, slightly drooping, and borne on branching peduncles in erect terminal bunches.

The plant is a native of Europe, where it grows in shady and moist places, and flowers in July.

The leaves, which are the part used, have when fresh a rank fetid odour, and a bitter somewhat acrid taste; but these properties are diminished by drying. Water extracts their virtues, forming a reddish infusion, which is blackened by the persulphate of iron.

Medical Properties and Uses. Figwort leaves are said to be anodyne and diuretic, and to have repellent properties when externally applied. They were formerly considered tonic, diaphoretic, discutient, anthelmintic, &c.; and were thought to be useful in scrofula. They are at present very little employed, and never in this country. In Europe they are sometimes applied in the form of ointment or fomentation to piles, painful tumours and ulcers, and cutaneous eruptions.

Off. Prep. Unguentum Scrophulariæ, *Dub.* W.

SECALE CORNUTUM. *U.S.*

Spurred Rye. Ergot.

"Secale cereale. Semen morbo affectum. *The diseased seed.* Vel, Scle-otium clavus. *De Candolle.*" *U.S.*

Seigle ergoté, *Fr.;* Mutterkorn, *Germ.*

In several of the grains, the place of the seed is occupied by a morbid ex-rescence, which, from its resemblance to the spur of a cock, has received he name of *ergot*, adopted from the French. This excrescence occurs ost frequently in the rye, *Secale cereale* of botanists, and having been und, as produced by this plant, to possess valuable medicinal properties, as been introduced into the Pharmacopœia of the United States, under the reviously recognised title of *Secale cornutum*, or *spurred rye.* In the last dition of the Pharmacopœia it was transferred to the primary from the condary list, in which it was first placed.

Considerable difference of opinion has prevailed in relation to the nature this singular substance. At one time it was thought to be merely the seed tered by disease; and the opinion was maintained, that the morbid action epended on the puncture of an insect and the deposition of its egg, which by irritating the neighbouring parts gave rise to this excrescence, as the gall is produced in the oak. De Candolle, however, considers it a parasitic plant, belonging to the natural family of the *Fungi*, and the genus *Sclerotium*, and denominates it *Sclerotium Clavus*. An intermediate opinion is advocated by M. Léveillé, who, after careful observation of the development of the ergot, published the result of his inquiries in the Annals of the Linn. Society of Paris for the year 1826. According to this author, a soft viscid tubercle may be seen at the earliest stage of the flower, surmounting the germ, the character of which it changes, without preventing its growth. The germ becomes of a dark colour, and increasing in size pushes the tubercle before it, which also expands, and exudes a viscid matter, which spreads over the germ, and drying upon its surface, gives it a thin yellowish coating. This tubercle M. Léveillé considers a parasitic fungus, for which he proposes the name *Sphacelia segetum;* and the ergot is thus composed of the diseased grain incorporated with a distinct and independent vegetable production. It is in the coating given by the latter to the enlarged seed that he supposes the virtues of the spurred rye to reside; and very dry or very wet seasons are equally unfavourable to the full development of the medicine, the former because the coating breaks into scales and falls off, the latter because it is washed away by the rain. These statements need confirmation before they can be implicitly received.

Rye is most subject to this disease in poor and wet soils, and in rainy seasons. Intense heat succeeding continued rains is said to favour its development. The ergot usually projects out of the glume or husk beyond the ordinary outline of the spike or ear. In some spikes the place of the seeds is wholly occupied by the ergot, in others only two or three spurs are observed. It is stated that this substance is much more energetic when collected before than after harvest.

Properties. Ergot is in solid, brittle yet somewhat flexible grains, from six lines to an inch and a half long, from half a line to two lines in thickness, usually curved like a spur, tapering from near the middle, obtuse at the extremities, marked with a deep longitudinal furrow on one or both sides, of a violet-brown colour externally, yellowish-white within, of an unpleasant smell when in mass resembling that of putrid fish, and of a taste which is at first scarcely perceptible, but ultimately disagreeable and slightly acrid. It imparts its virtues to water and to alcohol. Vauquelin obtained from it—1. a yellowish fawn-coloured matter soluble in alcohol, 2. a violet colouring matter insoluble in alcohol but soluble in water, 3. a sweetish oleaginous substance in great abundance, 4. a fixed acid, probably the phosphoric, 5. an azotized substance in large proportion which easily became putrid, and 6. free ammonia, which escaped at the temperature of boiling water. According to a recent analysis by a German chemist of the name of Wiggers, ergot contains 35.0 per cent. of a peculiar fixed oil; 1.04 of a peculiar, white, crystallizable, very soft fatty matter; 0.75 of cerin; 46.18 of a substance analogous to fungin or the fleshy substance of mushrooms; 1.24 of a reddish-brown substance of a peculiar nauseous odour, and a bitter slightly acrid taste, soluble in alcohol, but insoluble in water and ether, and called *ergotin* by the discoverer, under the impression that it might be the active principle of ergot; 7.76 of a substance resembling osmazome; 1.55 of a peculiar saccharine matter; 2.32 of gummy extractive combined with an azotized colouring principle; and 1.46 of albumen; besides saline and earthy matters in minute proportion. (*Journ. de Pharm.* xviii. 534.)

Medical Properties and Uses. Given in small doses, ergot produces, in the system of the male, no obvious effects; but in the female, exhibits a strong tendency to the uterus, upon the contractile property of which it operates with great energy. It is perhaps the only medicine which specifically promotes contraction in this organ. In the quantity of half a drachm or a drachm it often occasions nausea or vomiting, and in still larger doses excites headach and febrile symptoms, and sometimes operates unpleasantly upon the brain. Its long continued use is highly dangerous, even when no immediate effects are perceptible. Terrible and devastating epidemics in different parts of the continent of Europe, particularly in certain provinces of France, have long been ascribed to the use of bread made from rye contaminated with this degenerate grain. Dry gangrene, typhus fever, and disorder of the nervous system attended with convulsions, are the forms of disease which have been observed to follow the use of this unwholesome food. It is true that ergot has been denied to be the cause; but accurate investigations made by competent men upon the spot where the epidemics have prevailed, together with the result of experiments made upon inferior animals, leave no room for reasonable doubt upon the subject.

The most important remedial application of ergot is founded on its power of promoting the contraction of the uterus. On the continent of Europe, in various parts of Germany, France, and Italy, it has long been empyrically employed by midwives for this purpose; and its German name of *mutterkorn* implies a popular acquaintance with its peculiar powers. But the attention of the medical profession was first called to it by a letter from Dr. Stearns of Saratoga county, in the state of New York, addressed to Dr. Ackerly, A.D. 1807, and published in the eleventh volume of the New York Medical Repository. Since that period the journals have teemed with communications attesting its efficacy in facilitating parturition; and though it has failed in the hands of some physicians, the general opinion of the profession is so decidedly in its favour, that it may now be considered among the established articles of the materia medica. When it has proved wholly inefficient, the result is probably ascribable to the inferior character of the particular parcel employed. In its operation upon the pregnant uterus it produces a constant unremitting contraction and rigidity, rather than that alternation of spasmodic effort and relaxation which is observable in the natural process of labour. Hence, unless the os uteri and external parts are sufficiently relaxed, the medicine would be likely to produce injury to the child by the incessant pressure which it maintains. Such in fact has been the observation of numerous practitioners, and the death of the infant is thought not unfrequently to result from the injudicious employment of the medicine. The cases to which it is thought to be especially adapted are those of lingering labour, when the os uteri is sufficiently dilated, and the external passages sufficiently relaxed, when no mechanical impediment is offered to the passage of the child, and the delay is ascribable solely to want of energy in the uterus. Other cases are those in which the death of the fœtus has been ascertained, and when great exhaustion or dangerous constitutional irritation imperiously calls for speedy delivery. The remedy may also be given to promote the expulsion of the placenta, to restrain inordinate hemorrhage after delivery, and to hasten the discharge of the fœtus in protracted cases of abortion. In women subject to dangerous flooding, a dose of ergot given immediately before delivery is said to have the happiest effects. In menorrhagia and uterine hemorrhage, unconnected with pregnancy, the medicine has long been empyrically employed; and is now found highly useful in the hands of regular practitioners. Its use has even been extended to hemorrhages from other organs, and with reputed good effect. Cases of hemorrhage from the lungs are recorded in which ergot has proved highly beneficial. It has also been employed in amenorrhœa, but not with encouraging success. Gonorrhœa, gleet, and leucorrhœa are among the complaints in which it has been recommended.

Ergot is given in substance, infusion, or decoction. The dose of the powder to a woman in labour is fifteen or twenty grains, to be repeated every twenty minutes, till its peculiar effects are experienced, or till the amount of a drachm has been taken. Of an infusion made in the proportion of one drachm of the ergot to four fluidounces of water, one-third may be given for a dose, and repeated with the same interval. For other purposes the dose of the medicine is ten or fifteen grains, repeated three times a day, and gradually increased, but not continued for a great length of time.

Ergot should be powdered only when wanted for use. W.

SENEGA.

Seneka.

"Polygala senega. Radix. *The Root.*" *U.S.*

Off. Syn. SENEGÆ RADIX. Polygala Senega. Radix. *Lond.;* POLYGALÆ SENEGÆ RADIX. *Ed.;* POLYGALA SENEGA. Radix. *Dub.*

Polygale de Virginie, *Fr.;* Klapperschlangenwurzel, *Germ.;* Poligala Virginiana, *Ital.*

POLYGALA. *Sex. Syst.* Diadelphia Octandria.—*Nat. Ord.* Polygaleæ.

Gen. Ch. Calyx five-leaved, with two leaflets wing-shaped, and coloured. *Legume* obcordate, two celled. *Willd.*

Besides the *P. Senega*, two other species have attracted some attention in Europe—the *P. amara* and *P. vulgaris*—as remedies in chronic pectoral affections; but as they are not natives of this country, and are never used by practitioners here, they do not merit particular notice.

Polygala Senega. Willd. *Sp. Plant.* iii. 894; Bigelow, *Am. Med. Bot.* ii. 97; Barton, *Med. Bot.* ii. 111. This unostentatious plant has a perennial branching root, from which several erect, simple, smooth, round, leafy stems annually rise, from nine inches to a foot in height. The stems are occasionally tinged with red or purple in their lower portion, but are green near the top. The leaves are alternate or scattered, lanceolate, pointed, smooth, bright green on the upper surface, paler beneath, and sessile or supported on very short footstalks. The flowers are small, white, and arrange in a close spike at the summit of the stem. The calyx is the most conspicuous part of the flower. It consists of five leaflets, two of which are wingshaped, white, and larger than the others. The corolla is small and closed The capsules are small, much compressed, obcordate, two-valved, two-celled and contain two oblong ovate, blackish seeds, pointed at one extremity.

This species of Polygala, commonly called *Seneka snakeroot*, grows wil in all parts of the United States, but most abundantly in the southern an western sections, where the root is collected in great quantities for sale. I is brought into market in bales weighing from fifty to four hundred pounds.

Properties. As the root occurs in commerce, it is of various sizes, fro that of a small quill to that of the little finger, presenting a thick knotty hea which exhibits traces of the numerous stems. It is tapering, branched, variously twisted, often marked with crowded annular protuberances, and wit a projecting keel-like line, extending along its whole length. The epiderm is corrugated, transversely cracked, of a yellowish-brown colour in the youn roots, and brownish-gray in the old. In the smaller branches the colour is a lighter yellow. The bark is hard and resinous, and contains the active principles of the root. The central portion is ligneous, white, and quite inert, and should be rejected in the preparation of the powder. The colour of this is gray. The odour of seneka is peculiar, strong in the fresh root, but faint in the dried. The taste is at first sweetish and mucilaginous, but after chewing becomes somewhat pungent and acrid, leaving a peculiar irritating sensation in the fauces. These properties, as well as the medical virtues of the root, are extracted by boiling water, and by alcohol; but the alcoholic solution is said to be less acrid than the decoction. Diluted alcohol is an excellent solvent. The root does not impart either taste or smell to water distilled from it. According to Gehlen, it contains 6.15 per cent. of a peculiar principle to which the name of *senegin* has been given, 7.5 of a soft resin, 26.85 of a sweetish and somewhat acrid extractive matter, 9.5 of gum with a little albumen, and 46.0 of lignin. *Senegin*, which has been supposed to be the active principle, is obtained by treating the alcoholic extract of the root successively with ether and water, which dissolve the sof resin and extractive, and leave the substance in question. This should be well washed with water. When dried it is translucent, brown, hard, and brittle. It has an acrid taste, which is especially sensible in the fauces, in this respect resembling that of seneka itself. It is more soluble in diluted than in concentrated alcohol, is insoluble in ether and the oils, and when quite pure is insoluble in water. When associated, however, with the other principles of the root, it is in part dissolved by the last mentioned fluid. Hence the extractive matter has an acrid taste, and the decoction of seneka is active. It is hardly probable that the senegin, as above obtained, is completely isolated. M. Peschier of Geneva obtained from the root a substance which he supposed to be alkaline, and to exist combined with a peculiar acid; but his experiments require confirmation. M. Feneulle of Cambray obtained 1. a pale yellow colouring matter, 2. a bitter substance, 3. gum, 4. pectic acid, 5. albumen, 6. volatile oil, 7. fixed oil, 8. saline and earthy matters. To M. Dulong d'Astafort the root yielded a peculiar alkaline principle, resin, gummy matter, a colouring matter analogous to wax, a yellow colouring matter, a substance reddened by the action of sulphuric acid, pectic acid, and salts. Still more recently an analysis by M. Folki presented the following results; viz. a thick oil in part volatile, free gallic acid, wax, an acrid principle, a yellow colouring matter, an azotized matter, and various salts.

The roots of the *Panax quinquefolium* or ginseng are frequently mixed with the seneka, but are easily distinguishable by their shape and taste.

Medical Properties and Uses. Seneka is a stimulating expectorant and diuretic, and in large doses proves emetic and cathartic. It appears indeed to excite more or less all the secretions, proving occasionally diaphoretic and emmenagogue, and increasing the flow of saliva. Its action, however, is more especially directed to the lungs; and its expectorant virtues are those for which it is chiefly employed. It was introduced into practice about a century ago by Dr. Tennant of Virginia, who recommended it as a cure for the bite of the rattlesnake and in various pectoral complaints. As an expectorant it is employed in cases not attended with inflammatory action, or in which the inflammation has in great measure been subdued. It is peculiarly useful in chronic catarrh, humoral asthma, the secondary stages of croup, and in peripneumonia notha after sufficient depletion. By Dr. Archer of Maryland it was recommended in the early stages of croup; but under these circumstances it is now seldom given unless in combination with squill and an antimonial, as in the *Mel Scillæ Compositum.* Employed so as to purge and vomit it has proved useful in rheumatism; and some cases of dropsy are said to have been cured by it. Amenorrhœa also is among the complaints for which it has been recommended.

The dose of powdered seneka is from ten to twenty grains; but the form of decoction is that in which the medicine is most conveniently administered. (See *Decoctum Senegæ.*) There is an officinal syrup; and an extract and tincture may be prepared, though neither is much employed.

Off. Prep. Decoctum Senegæ, *U.S., Lond., Ed., Dub.;* Mel Scillæ Compositum, *U. S.;* Syrupus Senegæ, *U.S.*

W.

SENNA. *U.S.*

Senna.

"Cassia acutifolia, Cassia obovata, et Cassia elongata. Folia. *The leaves.*" *U.S.*

Off. Syn. SENNÆ FOLIA. Cassia Senna. Folia. *Lond.;* CASSIÆ SENNÆ FOLIA. *Ed.;* SENNA. CASSIA SENNA. Folia. *Dub.*

Séné, *Fr.;* Sennesblätter, *Germ.;* Senna, *Ital., Port.;* Sen, *Span.*

Cassia. See CASSIA FISTULA.

The plants which yield senna belong to the genus Cassia, of which several species contribute to furnish the drug. These were confounded together by Linnæus in a single species, which he named Cassia Senna. Since his time the subject has been more thoroughly investigated, especially by Delile, who accompanied the French expedition to Egypt, and had an opportunity of examining the plant in its native country. Botanists at present distinguish at least three species, the C. acutifolia, the C. obovata, and the C. elongata, on each of which we shall offer a few observations.

2. *Cassia acutifolia.* Delile, *Flore d'Egypte*, lxxv. tab. 27. f. 1. This is a small undershrub, from two to three feet high, with a straight, woody, branching, whitish stem. The leaves are pinnate, alternately placed upon the stem, and have at their base two small narrow pointed stipules. The leaflets, of which four or five pairs belong to each leaf, are almost sessile, oval lanceolate, acute, oblique at their base, nerved, from half an inch to an inch in length, and of a yellowish-green colour. The flowers are yellow, and arranged in axillary spikes. The fruit is a flat, elliptical, obtuse, membranous, smooth, grayish-brown, bivalvular legume, about an inch long and half an inch broad, scarcely if at all curved, and divided into six or seven cells, each containing a hard, heart-shaped, ash-coloured seed. The C. acutifolia grows wild in great abundance in Upper Egypt near Sienne, in Nubia, Sennaar, and probably in other parts of Africa having similar qualities of soil and climate. It is this species that furnishes the Tripoli senna, and the greater part of that variety known in commerce by the title of Alexandria senna.

2. *Cassia obovata.* Colladon, *Monographie des Casses*, p. 92. tab. 15. fig. a.; De Cand., *Prodrom.*, ii. 492. The stem of this species is rather shorter than that of the C. acutifolia, rising to the height of only a foot and a half. The leaves have from five to seven pairs of leaflets, which are obovate, very obtuse, sometimes mucronate, in other respects similar to those of the preceding species. The flowers are in axillary spikes, of which the peduncles are longer than the leaves of the plant. The legumes are very much compressed, curved almost into the kidney form, of a greenish-brown colour

and covered with a very short down, which is perceptible only by the aid of a magnifying glass. They contain from eight to ten seeds. This plant, which according to M. Merat is annual, grows wild in Syria, Egypt, and Senegal; and is said to have been cultivated successfully in Italy, Spain, and the West Indies. It yields the variety of senna called in Europe Aleppo senna, and contributes to the packages of the Alexandrian.

3. *Cassia elongata.* Lemaire, *Journ. de Pharm.*, vii. 345; Fée, *Journ. de Chim. Med.*, vi. 232. This name was conferred by M. Lemaire upon the plant from which the India senna of commerce is derived. The botanical description was completed by M. Fée, from dried specimens of the leaves and fruit found by him in unassorted parcels of this variety of senna. Each leaf has five pairs of leaflets. These are elongated, acute, thin and flexible, obscurely mucronate, oblique, and with very short petioles; which are somewhat swollen, but not glandular. The most striking characteristic of the leaflet is its length, which varies from an inch to twenty lines. Its breadth is from three to five lines. The legumes are thin, shining, smooth, a little curved, mucronate and very obtuse at the summit, of a greenish-olive colour towards the edges, and blackish in the centre. They contain from five to seven irregular heart-shaped seeds. This species has not yet been examined by botanists in its native state. It is inferred, however, from the sources whence the variety of senna which it furnishes is brought, that it grows in the southern parts of Arabia.

Besides the three species of senna plants above described, a fourth is mentioned by some authors—the *C. lanceolata*—so named by Forskhal, who found it growing in the deserts of Arabia. Some difference, however, of opinion exists as to the justice of its claims to the rank of a distinct species. De Candolle considers it only a variety of the C. acutifolia, from the ordinary form of which it differs chiefly in having leaflets with glandular petioles. It has been supposed by some to be the source of the India and Mocha senna; but the leaflets in this variety are much longer than those of the C. lanceolata, from which they differ also in having no glands. Niebuhr informs us that he found the Alexandria senna growing in the Arabian territory of *Abuarish*, whence it is taken by the Arabs to Mecca and Jedda. This is probably the C. lanceolata of Forskhal.

Commercial History. Several varieties of this valuable drug are known in commerce. Of these we receive three only in America, the Alexandria, the Tripoli, and the India senna.

1. *Alexandria Senna.* Though the name of this variety is derived from the Egyptian port at which it is shipped, it is in fact gathered very far in the interior of the country. The Alexandria senna does not consist exclusively of the product of one species of Cassia. The history of its preparation is not destitute of interest. The senna plants of Upper Egypt yield two crops annually, one in spring and the other in autumn. They are gathered chiefly in the country beyond Sienne. The natives cut the plants, and having dried them in the sun, strip off the leaves and pods which they pack in bales, and send to Boulac, in the vicinity of Cairo, the great entrepot for this article of Egyptian commerce. This senna from Upper Egypt, consisting chiefly though not exclusively of the product of the C. acutifolia, is here mixed with the leaflets of the C. obovata, brought from other parts of Egypt, and even from Syria, and with the leaves of the *Cynanchum oleæfolium*, known commonly by the name of *argel* or *arguel.* A small portion of Mocha or Arabian senna is also probably added; and it is said that the leaves of the *Colutea arborescens* and *Coriaria myrtifolia* have been occasionally found in the parcels which reach the European market. Accord-

ing to M. Royer, the proportions in which the three chief constituents of this mixture are added together, are five parts of the C. acutifolia, three of the C. obovata, and two of Cynanchum. Thus prepared, the senna is again packed in bales, and transmitted to Alexandria. It is by no means improbable that a similar mixture is effected in this place of the C. acutifolia from Tripoli with the C. obovata from Syria. The Alexandria senna is often called in the French pharmaceutic works *séné de la palthe*, a name derived from an impost formerly laid upon it by the Ottoman Porte. If a parcel of this commercial variety of senna be carefully examined, it will be found to consist of the following ingredients:—1. The leaflets of the C. acutifolia, characterized by their acute pointed form, and their length always less than an inch; 2. the leaflets of the C. obovata, known by their rounded very obtuse summit, which is sometimes furnished with a small projecting point, and by their gradual diminution in breadth towards their base; 3. the pods, broken leafstalks, and fine fragments of other parts of one or both of these species; 4. the leaves of the Cynanchum oleæfolium, which are distinguishable by their length, almost always more than an inch, their greater thickness and firmness, the absence of any visible lateral nerves on their under surface, their somewhat lighter colour, and the regularity of their base. In this last character they strikingly differ from the genuine senna leaflets, which, from whatever species derived, are always marked by obliquity at their base, one side being inserted in the petiole at a point somewhat lower than the other, and at a different angle. The discrimination between this and the other ingredients is a matter of some consequence, as the cynanchum must be considered an adulteration. It is said by the French writers to occasion hypercatharsis and much irritation of the bowels. Besides the above constituents of Alexandria senna, it occasionally contains leaflets of genuine senna, much longer than those of the acutifolia or obovata, equalling in this respect the cynanchum, which they also somewhat resemble in form. They may be distinguished however by their greater thinness, the distinctness of their lateral nerves, and the irregularity of their base. They are probably, as before stated, the product of the C. elongata, and are brought to Egypt from Mocha in Arabia. The Alexandria senna sometimes comes to our market with very few leaves of the obovate senna and Cynanchum, and is then probably a portion of the product brought directly to Alexandria from Upper Egypt, without having undergone any intermixture at Boulac or other intervening place.

2. *Tripoli Senna.* It has been customary in England and this country to consider the Tripoli senna as very impure; and Paris expressly states, that it contains a much larger proportion than the Alexandrian of cynanchum and other adulterations. This, however, is a mistake, which has probably arisen from the inferior price commanded by this variety; and it is not uncommon to class indiscriminately together under this name all the least valuable parcels of the drug. The fact is, that the genuine Tripoli senna consists exclusively of the product of the C. acutifolia, containing neither the obovate senna nor the leaves of Cynanchum, and generally free even from the pods of the first mentioned species. The leaflets however are much broken up; and it is probably on this account that the variety is less esteemed than the Alexandrian. The aspect given to it by this state of comminution, and by the uniformity of its constitution, enables the eye at once to distinguish it from the other varieties of senna. The leaflets of the Tripoli senna, though undoubtedly derived from the C. acutifolia, differ in some respects from those of the same species contained in the Alexandrian. They are shorter, less acute, thinner, and more fragile; and their nerves are much less

distinct. From these characters of the Tripoli senna, there is good reason to believe, that the plant from which it is derived grows in a different region from the Egyptian, and in one less favourable to its full development. The general opinion is, that it is brought from Sennaar and Nubia in caravans across the desert, and receives its name from Tripoli simply as its place of export; but it is reasonably asked by M. Fée, how it could be afforded at a cheaper price than the Alexandrian, if thus brought on the backs of camels a distance of eight hundred leagues through the desert; and why, moreover, it should be unmixed with the obovate senna, if gathered in regions neighbouring to those from which the other variety is transmitted, which is known even when first gathered to contain a portion of this species. This author is of the opinion that the Tripoli senna grows upon the Mediterranean coast of Africa, in the vicinity of that city.

3. *India Senna.* This variety is in Europe sometimes called Mocha senna, and is identical with an article recently introduced into French commerce under the name of Senegambia senna, said to be derived from the western coast of Africa. It usually contains, besides the leaflets, considerable quantities of the pod, and of the petioles or leafstalks. The leaflets are all of the same character, and are evidently the product of the same plant. The eye is at once struck by their great length and comparative narrowness, so that no difficulty can be experienced in distinguishing this variety. The pike-like shape of the leaflet has given rise to the name of *séné de la pique*, by which it is known in French Pharmacy. It has been already stated that the title of C. elongata has been conferred upon the species from which it is derived. Though denominated India senna, and certainly imported from Calcutta and perhaps other ports of Hindostan, it appears not to be the growth of that country. Ainslie informs us that senna grows abundantly in India; but that it is of the species with obtuse leaves, and is not held in high estimation. A better sort, distinguished by its pointed leaves, is taken to India from Mocha, and extensively consumed. This is undoubtedly identical with that which we obtain from India, and of which the native country is Arabia Felix. It is said by Ainslie that the Arabian senna plant has been recently introduced into the South of India and pronises to succeed.

The senna of the Mediterranean is brought to our markets chiefly from Marseilles. The India or Mocha variety comes either directly from Calcutta, or by the route of London, where it is purchased at the East India Company's sales.

Commercial senna is prepared for use by picking out the leaflets, and rejecting the leafstalks, the small fragments, and the leaves of other plants. The pods are also rejected by some apothecaries; but they appear to possess he cathartic virtue to a considerable extent, if not equally with the leaves; nd, though not adopted by the American or British Pharmacopœias, are recognised as officinal in the Paris Codex.

Properties. The odour of senna is faint and sickly; the taste slightly itter, sweetish, and nauseous. Water and alcohol extract its active princiles. The leaves yield about one-third of their weight to boiling water, one int of which is requisite to exhaust the strength of an ounce of the medine. The infusion is of a deep reddish-brown colour, and preserves the lour and taste of the leaves. When exposed to the air for a short time, it eposites a yellowish insoluble precipitate, supposed to result from the union extractive matter with oxygen. The nature of this precipitate, however, not well understood. Decoction also produces some change in the principles of senna, by which its medicinal virtues are impaired. To diluted alcohol it imparts the same reddish-brown colour as to water; but rectified alcohol and ether digested upon the powdered leaves become of a deep olive-green. The analysis of senna by MM. Lassaigne and Feneulle furnished the following results. The leaves contain—1. a peculiar principle called cathartin; 2. chlorophylle or the green colouring matter of leaves; 3. a fixed oil; 4. a small quantity of volatile oil; 5. albumen; 6. a yellow colouring matter; 7. mucilage; 8. salts of the vegetable acids, viz. malate and tartrate of lime and acetate of potassa; and 9. mineral salts. The pods are composed of the same principles, with the exception of the chlorophylle, the place of which is supplied by a peculiar colouring matter. (*Journ. de Pharm.* vii. 548. *and* ix. 58.) Of these constituents, the most interesting and important is the *cathartin*, which is said to be the active principle of senna, and derived its name from this circumstance. It is an uncrystallizable substance, having a peculiar smell, a bitter, nauseous taste, and a reddish-yellow colour; is soluble in every proportion in water and alcohol, but insoluble in ether; and in its dry state attracts moisture from the air. It is prepared in the following manner. To a filtered decoction of senna the solution of acetate of lead is added; and the precipitate which forms is separated. A stream of hydrosulphuric acid (sulphuretted hydrogen) is then made to pass through the liquor in order to precipitate the lead, and the sulphuret produced is removed by filtration. The liquid is now evaporated to the consistence of an extract; the product is treated with rectified alcohol; and the alcoholic solution is evaporated. To the extract thus obtained sulphuric acid diluted with alcohol is added, in order to decompose the acetate of potassa which it contains; the sulphate of potassa is separated by filtration; the excess of sulphuric acid by the acetate of lead; the excess of acetate of lead by hydrosulphuric acid; and the sulphuret of lead by another filtration. The liquid being now evaporated yields *cathartin.*

Incompatibles. Many substances afford precipitates with the infusion of senna; but it by no means follows that they are all medicinally incompatible; as they may remove ingredients which have no influence upon the system, and leave the active principles unaffected. Cathartin is precipitated by the infusion of galls and probably other astringents, and by the solution of subacetate of lead. The acetate of lead and tartarized antimony, which disturb the infusion of senna, have no effect upon the solution of this principle.

Medical Properties and Uses. Senna was first used as a medicine by the Arabians. It was noticed in their writings so early as the ninth century; and the name itself is Arabic. It is a prompt, efficient, and very safe purgative, well calculated for fevers and febrile complaints, and other cases in which a decided but not violent impression is desired, An objection sometimes urged against it is that it is apt to produce severe griping pain in the bowels. This effect, however, may be obviated by combining with the senna some aromatic and some one of the alkaline salts, especially the supertartrate of potassa, tartrate of potassa, or sulphate of magnesia. The explanation which attributes the griping property to the oxidized extractive, and its prevention by the neutral salts to their influence in promoting the solubility of this substance, is not entirely satisfactory. The purgative effect o senna is considerably increased by combination with bitters, a fact whicl was noticed by Cullen, and has been abundantly confirmed by the experi ence of others. The decoction of guaiac is said to exert a similar influence The dose of senna in powder is from half a drachm to a drachm; but it bulk renders it of inconvenient administration; and it is not often prescribe in this state. Besides, the powder is said to undergo decomposition, and t become mouldy on exposure to a damp air. The form of infusion is almost universally preferred. (See *Infusum Sennæ.*) The medicine is sometimes used in the form of confection and of tincture.

Off. Prep. Confectio Sennæ, *U.S., Lond., Ed., Dub.;* Extractum Cassiæ Sennæ, *Ed.;* Infusum Sennæ, *U.S., Lond., Dub.;* Infusum Tamarindi cum Senna, *Ed., Dub.;* Pulvis Sennæ Compositus, *Lond.;* Tinctura Rhei et Sennæ, *U.S,;* Tinctura Sennæ, *Lond., Dub.;* Tinctura Sennæ Composita, *Ed.;* Tinctura Sennæ et Jalapæ, *U.S.;* Syrupus Rhei et Sennæ, *U.S.;* Syrupus Sennæ, *Dub.* W.

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SERPENTARIA. *U.S.*

Virginia Snakeroot.

"Aristolochia serpentaria. Radix. *The root.*" *U.S.*

Off. Syn. SERPENTARIÆ RADIX. Aristolochia Serpentaria. Radix. *Lond.;* ARISTOLOCHIÆ SERPENTARIÆ RADIX. *Ed.;* ARISTOLOCHIA SERPENTARIA. Radix. *Dub.*

Serpentaire de Virginie, *Fr.;* Virginianische Schlangenwurzel, *Germ.;* Serpentaria Virginiana, *Ital., Span.*

ARISTOLOCHIA. *Sex. Syst.* Gynandria Hexandria.—*Nat. Ord.* Aristolochiæ.

Gen. Ch. *Calyx* none. *Corolla* one-petaled, ligulate, ventricose at the base. *Capsule* six-celled, many-seeded, inferior. *Willd.*

Numerous species of Aristolochia have been employed in medicine. The roots of all of them are tonic and stimulant, and from their supposed possession of emmenagogue properties, have given origin to the name of the genus. The *A. Clematitis*, *A. longa*, *A. rotunda*, and *A. Pistolochia*, are still retained in many officinal catalogues of the continent of Europe, where they are indigenous. The root of the *A. Clematitis* is very long, cylindrical, as thick as a goose quill or thicker, variously contorted, beset with the remains of the stems and radicles, of a grayish-brown colour, a strong peculiar odour, and an acrid bitter taste; that of the *A. longa* is spindleshaped, from a few inches to a foot in length, of the thickness of the thumb or more, fleshy, very brittle, grayish externally, brownish-yellow within, bitter, and of a strong disagreeable odour when fresh; that of the *A. rotunda* is tuberous, roundish, heavy, fleshy, brownish on the exterior, grayish-yellow internally, and similar to the preceding in odour and taste; that of the *A. Pistolochia* consists of numerous slender yellowish or brownish fibres attached to a common head, and possessed of an agreeable aromatic odour, with a taste bitter and somewhat acrid. Many species of Aristolochia growing in the West Indies, Mexico, and South America, have attracted attention for their medicinal properties, and some, like our own snakeroot, have acquired the reputation of antidotes for the bites of serpents. In the East Indies, the *A. Indica* is employed for similar purposes with the European and American species; and the Arabians are said by Forskhal to use the leaves of the *A. sempervirens* as a counter-poison. We have within the limits of the United States four species, of which three—the *A. Serpentaria*, *A. tomentosa*, and *A. hastata*—contribute indiscriminately to furnish the snakeroot of the shops, though one only, the *A. Serpentaria*, is admitted into the Pharmacopœia.

Aristolochia Serpentaria. Willd. *Sp. Plant.* iv. 159; Bigelow, *Am. Med. Bot.* iii. 82; Barton, *Med. Bot.* ii. 41. This species of Aristolochia is an herbaceous plant with a perennial root, which consists of numerous slender fibres proceeding from a short horizontal caudex. Several stems often rise from the same root. They are about eight or ten inches in height, slender, round, flexuose, jointed at irregular distances, and frequently of a reddish or purple colour at the base. The leaves are oblong cordate, acuminate, entire, of a pale yellowish-green colour, and supported on short petioles at the joints of the stem. The flowers proceed from the joints near the root, and stand singly on long, slender, round, jointed peduncles, which are sometimes furnished with one or two small scales, and bend downward so as nearly to bury the flower in the earth or decayed leaves. There is no calyx. The corolla is of a purple colour, monopetalous, tubular, swelling at the base, contracted and curved in the middle, and terminating in a labiate border with lanceolate lips. The anthers—six or twelve in number—are sessile, attached to the under part of the stigma, which is roundish, divided into six parts, and supported by a short fleshy style upon an oblong, angular, hairy, inferior germ. The fruit is an hexangular, six-celled capsule, containing several small flat seeds.

The plant grows in rich, shady woods, throughout the Middle, Southern, and Western States, abounding in the valley of the Ohio, and in the mountainous regions of our interior. It flowers in May and June. The root is collected in Western Pennsylvania and Virginia, in Ohio, Indiana, and Kentucky, and is brought to the eastern markets chiefly by the route of Wheeling and Pittsburg. As it reaches Philadelphia, it is usually in bales containing one hundred pounds, and is often mixed with the leaves and stems of the plant, and with dirt from which it has not been properly cleansed at the time of collection.

A. tomentosa. Nuttall, *Gen. of N. Am. Plants*, p. 199.—*A. hirsuta*, Muhl. *Catal.* p. 81. The stem of this species is twining, and ascends to the summit of the tallest trees. Its leaves are roundish cordate, and villous on the under surface; the peduncles solitary and without bractes; the corolla densely villous, with a three-cleft, greenish-yellow border, and an oblique gaping orifice, the margin of which is elevated, rugose, and dark purple, while the interior of the tube is white, spotted with purple. The stigmas are three, and the anthers immersed in the style. The plant grows abundantly throughout Louisiana, on the banks of the Mississippi, on the mountains of South Carolina, and probably in other parts of the Western and Southern States.

A. hastata. Nuttall, *Gen. of N. Am. Plants*, p. 200.—*A. sagittata.* Muhl. *Catal.* This species, if indeed it can be considered a distinct species, differs from the A. Serpentaria in having hastate, acute, somewhat cordate leaves, radical peduncles, and the lip of the corolla ovate. It flourishes on the banks of the Mississippi, in Carolina, and elsewhere.

The roots of the two latter species scarcely differ from those of the officinal plant, and are frequently mixed with them, as is evinced by the presence of the characteristic leaves of the *A. tomentosa* and *A. hastata* in the parcels brought into market. (See *Journ. of the Phil. Col. of Pharm.* vol. i. p. 264.)

Properties. Virginia snakeroot, as found in the shops, is in tufts of long, slender, frequently interlaced and brittle fibres, attached to a short, contorted, knotty head or caudex. The colour, which in the recent state is yellowish, becomes brown by time. That of the powder is grayish. The smell is strong, aromatic, and camphorous; the taste warm, very bitter, and also camphorous. The root yields all its virtues to water and to alcohol, producing with the former a yellowish-brown infusion, with the latter a bright greenish tincture, which is rendered turbid by the addition of water. Chevallier found in the root, volatile oil, a yellow bitter principle soluble in water and alcohol, resin, gum, starch, albumen, lignin, and various salts. Bucholz obtained from 1000 parts, 5 of a green fragrant volatile oil, 28.5 of a yellowish-green resin, 17 of extractive matter, 181 of gummy extract, 624 of lignin, and 144.5 of water. The active ingredients are probably the volatile oil, and the yellow bitter principle of Chevallier, which that chemist considers analogous to the extract of quassia called *quassin* by Dr. Thomson. The volatile oil passes over with water in distillation, rendering the liquid milky, and impregnating it with the peculiar odour of the root. Dr. Bigelow states that the liquid on standing deposites round the edges of its surface small crystals of camphor.

Dr. A. T. Thomson in his Dispensatory informs us that the roots of the *Collinsonia præcox*, the *C. scabra* of Pursh, are often mixed with those of *A. Serpentaria.* This is not the case with the drug as brought to the Philadelphia market; but the roots of the *Spigelia Marilandica* are sometimes found associated with it. They may be distinguished by the absence of the bitter taste, and when the stem and foliage are attached, by the peculiar character of these parts of the plant. (See *Spigelia.*)

Medical Properties and Uses. Serpentaria is a stimulant tonic, acting also as a diaphoretic or diuretic, according to the mode of its application. Too largely taken, it occasions nausea, griping pains in the bowels, sometimes vomiting and dysenteric tenesmus. It is admirably adapted to the treatment of typhoid fevers, whether idiopathic or symptomatic, when the system begins to feel the necessity for support, but is unable to bear active stimulation. In exanthematous diseases in which the eruption is tardy or has receded, and the grade of action is low, it is thought to be useful by promoting the cutaneous affection. It has also been highly recommended in intermittent fevers; and though itself generally inadequate to the cure of the complaint, often proves serviceable as an adjunct to Peruvian bark or the sulphate of quinia. With he same remedies it is frequently associated in the treatment of typhous diseases. It is sometimes given in dyspepsia, and is employed as a gargle in nalignant sorethroat.

The dose of the powdered root is from ten to thirty grains; but the infuion is almost always preferred. (See *Infusum Serpentariæ.*) The decocion or extract would be an improper form, as the volatile oil, upon which he virtues of the medicine partly depend, is dissipated by boiling.

Off. Prep. Electuarium Opiatum, *Ed.;* Infusum Serpentariæ, *U.S.;* Tincura Cinchonæ Composita, *U.S., Lond., Ed., Dub.;* Tinctura Serpentariæ, *J.S., Lond., Ed., Dub.*

W.

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SESAMUM. *U.S. Secondary.*

Benne.

"Sesamum orientale. Folia. *The leaves.*" *U.S.*

OLEUM SESAMI. *U.S. Secondary.*

Benne Oil.

"Sesamum orientale. Seminum oleum. *The oil of the seeds.*" *U.S.*

Sesame, *Fr.;* Sesam, *Germ.;* Sesamo, *Ital.;* Ajonjoli, *Span.*

Sesamum. *Sex. Syst.* Didynamia Angiospermia.—*Nat. Ord.* Bignoniæ, *Juss.;* Pedalineæ, *R. Brown, Lindley.*

Gen. Ch. *Calyx* five parted. *Corolla* bell-shaped, five-cleft, with the lower lobe largest. *Stamens* five, the fifth a rudiment. *Stigma* lanceolate. *Capsule* four-celled, *Willd.*

Though the *Sesamum orientale* has been indicated by the United States Pharmacopœia as the medicinal plant, there is reason to believe that the *S. Indicum* is that cultivated in our Southern States; at least we have found plants raised in Philadelphia from seeds obtained from Georgia, to correspond more closely with the description of the latter, as given by Willdenow. We give the specific character of both.

Sesamum orientale. Willd. *Sp. Plant.* iii. 358; Rheed. *Hort. Malab.* ix. 54. "Leaves ovate, oblong, entire."

Sesamum Indicum. Willd. *Sp. Plant.* iii. 359; Curtis, *Bot. Mag.* vol. xli. t. 1688. "Leaves ovate-lanceolate, the inferior three-lobed, the superior undivided. Stem erect."

The benne plant of our Southern States is annual, with a branching stem, which rises four or five feet in height, and bears opposite, petiolate leaves, varying considerably in their shape. Those on the upper part of the plant are ovate-lanceolate, irregularly serrate, and pointed; those near the base three-lobed and sometimes ternate; and lobed leaves are not uncommon at all distances from the ground. The flowers are of a reddish-white colour, and stand solitarily upon short peduncles in the axils of the leaves. The fruit is an oblong capsule, containing small, oval, yellowish seeds.

These two species of Sesamum are natives of the East Indies, and have been cultivated from time immemorial in various parts of Asia and Africa. From the latter continent it is supposed that seeds were brought by the Negroes to our Southern States, where, as well as in the West Indies, one or both species are now cultivated to a considerable extent. It has been found that the plant above described will grow vigorously in the gardens so far north as Philadelphia.

The seeds are employed as food by the negroes, who parch them over the fire, boil them in broths, make them into puddings, and prepare them in various other modes. By expression they yield a fixed oil, which, as well as the leaves of the plant, has been introduced into the secondary catalogue of our national Pharmacopœia.

1. *Oil of Benne.* This is inodorous, of a bland sweetish taste, and will keep very long without becoming rancid. It bears some resemblance to olive oil in its properties, and may be used for similar purposes. It was known to the ancient Persians and Egyptians, and is highly esteemed by the modern Arabs, and other people of the East, both as food, and as an external application to promote softness of the skin. Like olive oil, it is laxative in large doses.

2. *Leaves.* These abound in a gummy matter, which they readily impart to water, forming a rich bland mucilage, much used in the Sourthern States as a drink in various complaints to which demulcents are applicable, as in cholera infantum, diarrhœa, dysentery, catarrh, and affections of the urinary passages. The remedy has attracted some attention further northward, and has been employed with favourable results by physicians in Philadelphia. One or two fresh leaves stirred about in half a pint of cool water, will soon render it sufficiently viscid. In their dried state they should be introduced into hot water. The leaves also serve for the preparation of emollient cataplasms.

W.

SEVUM. *U.S.*

Suet.

"Ovis aries. Sevum curatum. *The prepared suet. U.S.*

Off. Syn. SEVUM PRÆPARATUM. *Lond.;* ADEPS OVILLUS. *Ed.;* ADEPS OVILLUS PRÆPARATUS. *Dub.*

Suif, Graisse de mouton, *Fr.;* Hammelstalg, *Germ.;* Grasse duro, *Ital.;* Sebo. *Span.*

Suet is the fat of the sheep taken chiefly from about the kidneys. The London and Dublin Colleges direct it to be prepared by cutting the fat into pieces, melting it with a moderate heat, and straining it through linen or flannel. In order to avoid too great a heat, the crude suet is sometimes purified by boiling it in a little water.

Mutton-suet is of a firmer consistence, and requires a higher temperature for its fusion than any other animal fat. It is very white, somewhat brittle, inodorous, of a bland taste, insoluble in water, and nearly so in alcohol. Boiling alcohol, however, dissolves it, and deposites it upon cooling. It consists, according to Chevreul, of stearin, elaïn, and a small proportion of hircin. For an account of the two first mentioned principles, the reader is referred to the article *Adeps*. *Hircin* is a liquid like elaïn, from which it differs in being much more soluble in alcohol, and in being converted into *hircic acid* by saponification. (See *Sapo.*)

Suet acquires by time an unpleasant smell, and becomes unfit for pharmaceutic purposes. It is employed exclusively to give a proper consistence to ointments and plasters.

W.

SIMARUBA. *U.S.*

Simaruba.

"Quassia simaruba. *Willd.* Simaruba officinalis. *De Candolle.* Simaruba Guyanensis. *Richard.* Cortex. *The bark.*" *U. S.*

Off. Syn. SIMAROUBÆ CORTEX. Quassia Simarouba. Cortex. *Lond.;* QUASSIÆ SIMARUBÆ CORTEX. *Ed.;* QUASSIA SIMARUBA. Cortex radicis. *Dub.*

Ecorce de simarouba, *Fr.;* Simarubarinde, *Germ.;* Corteccia di simaruba, *Ital.;* Cor-eza de simaruba, *Span.*

Quassia. See QUASSIA.

Quassia Simaruba. Willd. *Sp. Plant.* ii. 568; Woodv. *Med. Bot.* p. 69. t. 203. As this plant is polygamous, it belongs properly to the genus Simaruba, separated by De Candolle from the Quassia (see *Quassia*); but ve follow the Pharmacopœias in considering it under its former title. It is tree of considerable height and thickness, having alternate branches, with bark, which in the old tree is black and somewhat furrowed, in the young s smooth, gray, and marked here and there with broad yellow spots. The eaves are alternate and abruptly pinnate, with a naked petiole to which the eaflets are alternately attached by short footstalks. The leaflets are nearly lliptical, on the upper surface smooth and of a deep green colour, on the nder whitish. The flowers are of a yellow colour, and are disposed in ng axillary panicles. In some descriptions they are stated to be monœ-ous, in others diœcious. According to Dr. Wright, the female flowers are never found at Jamaica on the same tree with the male. The number of stamens is ten.

The tree is found in the West Indies and Guyana. In Jamaica it is called the mountain damson. Dr. A. T. Thomson is mistaken in stating that it is a native of Carolina. The *Simaruba amara* of Aublet, which grows in Guyana, and has generally been considered identical with the *Q. Simaruba*, is believed by Hayne to be a distinct species. The bark of the root is the part employed, the wood itself being nearly tasteless and inert.

Simaruba bark is in long pieces, some inches in breadth, folded lengthwise, light, flexible, tenacious, very fibrous, externally of a light brownish-yellow colour, rough, warty, and marked with transverse ridges, internally of a pale yellow. It is without smell, and of a bitter taste. It readily imparts its virtues, at ordinary temperatures, to water and alcohol. The infusion is at least equally bitter with the decoction, which becomes turbid as it cools. Its constituents, according to M. Morin, are a bitter principle, supposed by him to be identical with *quassin*, a resinous matter, a volatile oil having the odour of benzoin, malic acid, gallic acid in very minute proportion, an ammoniacal salt, malate and oxalate of lime, some mineral salts, oxide of iron, silica, ulmin, and lignin.

Medical Properties and Uses. Simaruba possesses the same tonic properties as other simple bitters, and may be employed for the same purposes. It was introduced into France in the year 1713 from Guyana, where it had previously been used as a remedy for dysentery. In the treatment of this disease and of obstinate diarrhœa it afterwards obtained much credit in Europe; but Cullen was right in denying to it any specific control over these complaints. It operates simply as a tonic; and, though it may be occasionally beneficial in relaxed and debilitated states of the alimentary canal, it would do much harm if indiscriminately prescribed in dysenteric cases.

On account of its difficult pulverization, it is seldom given in substance. The best mode of administration is by infusion. (See *Infusum Simaroubæ.*) The dose is from a scruple to a drachm.

Off. Prep. Infusum Simaroubæ, *Lond.*, *Dub.* W.

◆

SINAPIS. *U.S.*

Mustard.

"Sinapis nigra et sinapis alba. Semina, *The seeds.*" *U. S.*

Off. Syn. SINAPIS SEMINA. Sinapis nigra. Semina. *Lond.;* SINAPIS ALBÆ SEMINA. *Ed.;* SINAPIS ALBA. Semina. SINAPIS NIGRA. Seminum pulvis. *Dub.*

Moutarde, *Fr.;* Senfsamen, *Germ.;* Senapa, *Ital.;* Mostaza, *Span.*

SINAPIS. *Sex. Syst.* Tetradynamia Siliquosa.—*Nat. Ord.* Cruciferæ.

Gen. Ch. Calyx spreading. *Corolla* with straight claws. *Glands* between the shorter stamens and pistil, and between the longer stamens and calyx. *Willd.*

Sinapis nigra. Willd. *Sp. Plant.* iii. 555; Woodv. *Med. Bot.* p. 403. t. 146. Common or black mustard is an annual plant, with a stem three or four feet in height, divided and subdivided into numerous spreading branches. The leaves are petiolate, and variously shaped. Those near the root are large, rough, lyrate-pinnate, and unequally toothed; those higher on the stem are smooth and less lobed; and the uppermost are entire, narrow, smooth, and dependent. The flowers are small, yellow, with a coloured calyx, and stand closely together upon peduncles at the upper part of the branches. The pods are smooth, erect, nearly parallel with the branches, quadrangular, furnished with a short beak, and occupied by numerous seeds.

Sinapis alba. Willd. *Sp. Plant.* iii. 555; Smith, *Flor. Brit.* 721. The white mustard is also an annual plant. It is rather smaller than the preceding species. The lower leaves are deeply pinnatifid, the upper sublyrate, and all irregularly toothed, rugged with stiff hairs on both sides, and of a pale green colour. The flowers are in racemes, with yellow petals, and linear, green, calycine leaflets. The pods are spreading, bristly, rugged, roundish, swelling in the position of the seeds, ribbed, and provided with a very long ensiform beak.

Both plants are natives of Europe and cultivated in our culinary gardens; and the *S. nigra* has become naturalized in some parts of this country. Their flowers appear in June. The seeds are kept in the shops both whole and in the state of very fine powder, as prepared by the manufacturers for the table.

The *black mustard seeds* are small, globular, of a deep brown colour, slightly rugose on the surface, and internally yellow. In the entire state they are inodorous, but have a distinct smell in powder, and when rubbed with water or vinegar exhale a strong pungent odour, sufficient in some instances to excite a flow of tears. Their taste is bitterish, hot, and pungent, but not permanent. The *seeds of the white mustard* are much larger, of a yellowish colour, and less pungent taste. Both afford a yellow powder, which has a somewhat unctuous appearance, and cakes when compressed. Their skin contains a mucilaginous substance, which is extracted by boiling water, and abounds most in the white. When bruised or powdered they impart their active properties wholly to water, but in a very slight degree to alcohol. They yield upon pressure a fixed oil, of a greenish-yellow colour, little smell, and a mild not unpleasant taste; and the portion which remains is even more pungent than the unpressed seed. When black mustard seeds are distilled with water they afford a yellow volatile oil, soluble in alcohol and water, of an exceedingly pungent odour, an acrid and burning taste, containing a portion of sulphur, and capable, when applied to the skin, of producing very speedy vesication. Guibourt conjectured, and Robiquet and Boutron have proved, that this oil does not exist ready formed in the seeds, but is produced by the action of water. Hence the absence or very slight degree of odour in the seeds when bruised in a perfectly dry state, and their great pungency when water is added. It will probably be found that a principle exists in black mustard seed, containing sulphur as a constituent, which is converted into volatile oil by the agency of this fluid. MM. Robiquet and Boutron were unable to procure any volatile oil from he white mustard seeds. The active properties of these they found to depend n a fixed principle, not existing in the seeds, but developed, as the volaile oil in the former case, by the action of water or other agent. The ingrelient of the seeds which is converted into this acrid principle, they believe o be the *sulpho-sinapisin* discovered originally by MM. Henry the younger nd Garot in the oil of white mustard, afterwards found in the seeds themelves. Their reason for this belief is that mustard which has been preiously deprived of this ingredient, is incapable of developing the acrid rinciple. As the white mustard contains none of that substance which ffords the volatile oil when water is applied, so the black mustard contains ttle or none of the *sulpho-sinapisin* which in the former is converted by milar means into the active principle. The two varieties, therefore, differ essentially in their constitution, though it is probable that their respective characteristic ingredients are closely analogous, as they both contain sulphur. *Sulpho-sinapisin* is an interesting compound, as affording an instance of a proximate vegetable principle having sulphur as a constituent. Its other elements are carbon, hydrogen, oxygen, and nitrogen. It was at first thought by MM. Henry and Garot to be an acid, but has since been acknowledged to be a neutral substance. It is white, crystallizable, soluble in water and alcohol, producing a yellow solution, without smell, and of a taste analogous to that of mustard. (*Journ. de Pharm. Janv.* 1831.)

From the experiments of MM. Troupeau and Blanc, it appears that vinegar diminishes the irritating property of black mustard; and that a mixture of the powder with concentrated acetic acid in certain proportions is quite inert when applied to the skin, though either separately is capable of exciting severe inflammation. The same result does not appear to have been obtained with the white mustard seed. (*Archives Generales. Sept.* 1830.)

Medical Properties and Uses. Mustard seeds swallowed whole operate as a laxative, and have recently enjoyed great popularity as a remedy in dyspepsia, and in other complaints attended with torpid bowels and deficient excitement. The white seeds are preferred, and are taken in the dose of a tablespoonful once or twice a day, mixed with molasses, or previously softened and rendered mucilaginous by immersion in hot water. They probably act by mechanically stimulating the bowels. The bruised seeds or powder, in the quantity of a large teaspoonful, operate as an emetic. Mustard in this state is applicable to cases of great torpor of stomach, especially that resulting from narcotic poisons. It rouses the gastric susceptibility and facilitates the action of other emetics. In smaller quantities it is useful as a safe stimulant of the digestive organs; and, as it is frequently determined to the kidneys, has been usefully employed in dropsy. Whey made by boiling half an ounce of the bruised seeds or powder in a pint of milk, and straining, is a convenient form for administration. It may be given in the dose of a wineglassful repeated several times a day. But mustard is most valuable as a rubefacient. Mixed with water in the form of a cataplasm, and applied to the skin, it very soon produces redness with a burning pain which in less than an hour usually becomes insupportable. When a speedy impression is not desired, especially when the sinapism is applied to the extremities, the powder should be diluted with an equal portion of rye meal or wheat flour. Care should be taken not to allow the application to continue too long, as vesication with obstinate ulceration, and even sphacelus may result. This caution is particularly necessary in cases where the patient is insensible, and the degree of pain can afford no criterion of the sufficiency of the action.

Off. Prep. Infusum Armoraciæ Compositum, *U.S.*, *Lond.*, *Dub.;* Cataplasma Sinapis, *Lond.*, *Dub.;* Emplastrum Cantharidis Vesicatoriæ Comp., *Ed.* W.

* * *

SODIUM.

Sodium.

Sodium, *Fr.;* Natronmetall, Natrium, *Germ.;* Sodio, *Ital.*, *Span.*

Sodium is a peculiar elementary body of a metallic nature, forming the basis of the alkali soda. It was discovered by Sir H. Davy in 1807, who obtained it in minute quantity by decomposing the alkali by the agency of galvanic electricity. It was afterwards procured in much larger quantities by Gay-Lussac and Thenard, by bringing the alkali in contact with iron turnings heated to whiteness. The iron became oxidized, and the metallic basis of the soda was liberated.

Sodium is a soft, malleable, sectile solid, of a silver-white colour. It possesses the metallic lustre in a high degree when protected from the action of the air, by which it is quickly tarnished and oxidized. Its sp. gr. is 0.97, fusing point about 200°, and equivalent number 23.3. Its chemical affinities resemble those of potassium, but are by no means so energetic. Like potassium it has a strong attraction for oxygen. When thrown upon cold water it instantly fuses into a globule without inflaming, and traverses the surface in different directions with rapidity; on hot water it inflames. In both cases the water is decomposed, hydrogen is liberated, and a solution of soda generated. It combines also with a larger proportion of oxygen than exists in soda, forming the peroxide of sodium. This oxide is always formed when the metal is burnt in the open air.

Sodium is present in a number of important medicinal preparations, and is briefly described in this place as an introduction to these compounds. Its protoxide only is salifiable, constituting the alkali soda, which, united to acids, gives rise to a numerous class of compounds, called salts of sodium or salts of soda. This oxide consists of one equiv. of sodium 23.3, and one of oxygen 8 = 31.3. United with one equiv. of water 9, it forms hydrate of soda (caustic soda,) weighing 40.3.

Sodium unites also with chlorine, forming chloride of sodium, or common salt, and with most of the other simple non-metallic bodies. The officinal combinations containing sodium, are the chloride of sodium, the acetate, borate, carbonate, bicarbonate, phosphate, sulphate, and sulphuret of soda, and the tartrate of potassa and soda. The description of most of these combinations will immediately follow; while the remainder, being included among the "Preparations," will be noticed, under their respective titles, in the second part of the work.

B.

SODÆ ACETAS. *U.S., Dub.*

Acetate of Soda.

Acétate de soude, *Fr.;* Essigsaures Natron, *Germ.;* Acetato di soda, *Ital.*

Acetate of soda is officinal only in the Dublin and United States Pharmacopœias. In the former work it is included among the "Preparations," in the latter, with greater propriety, in the catalogue of the Materia Medica; as the salt is made in considerable quantities by the manufacturing chemist in the process for purifying pyroligneous acid.

Preparation. The Dublin College obtains this salt by saturating carbonate of soda with distilled vinegar, and evaporating the filtered solution until it attains the sp. gr. 1. 276. As the solution cools crystals will form, which must be cautiously dried, and kept in well stopped bottles. In conducting the process, the crystallized carbonate of soda will be found to require about eleven times its weight of distilled vinegar for saturation.

The acetate of soda is prepared in large quantities by the manufacturers of pyroligneous acid, for the purpose of being decomposed, so as to yield strong acetic acid by the action of sulphuric acid. (See *Acidum Aceticum Empyreumaticum*, and *Acidum Aceticum.*) The first step is to add to the impure acid as much chalk as it is capable of decomposing at common temperatures, and then to boil the liquor, and complete the saturation with slaked lime. During the saturation a quantity of blackish scum arises, which must be carefully removed. In this way an acetate of lime is formed, which must be decomposed by the requisite quantity of sulphate of soda. By double decomposition there become formed acetate of soda, which remains in solution, and sulphate of lime, which precipitates, carrying down with it more or less of the tarry impurities. After the sulphate of lime has completely subsided, the solution of acetate of soda is decanted, and concentrated to a pellicle; when it is transferred to crystallizers, in which it cools and crystallizes in mass. The acetate, in this state, is very impure, being black and impregnated with much tar. It is purified by drying, submitting it to the igneous fusion, solution in water, filtration, and repeated crystallizations. Sometimes animal charcoal is used to free the crystals from colour.

Properties, &c. Acetate of soda is a white salt, crystallizing in long striated prisms, and possessing a sharp, bitterish, not disagreeable taste. Exposed to the air it effloresces slowly, and loses about forty per cent. of its weight. It is soluble in about three parts of cold water, and in twenty-four of alcohol. Subjected to heat, it undergoes first the aqueous and then the igneous fusion, and is finally decomposed. By the affusion of sulphuric acid it is decomposed, the acetic acid being liberated, and sulphate of soda formed. It consists, when crystallized, of one equiv. of acetic acid 51.48, one of soda, 31.3, and six of water $54=136.78$.

Medical Properties and Uses. Acetate of soda is diuretic, and possesses generally the same medical properties as the acetate of potassa, to which article the reader is referred. It is, however, more convenient for exhibition than the latter salt, as it is not deliquescent. The dose is from one to four scruples. Its only pharmaceutical use is to yield strong acetic acid by the action of sulphuric acid, and for this purpose it is employed in the United States Pharmacopœia.

Off. Prep. Acidum Aceticum, *U.S.* B.

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SODÆ BORAS. *U.S.*

Borate of Soda.

Off. Syn. SODÆ SUBBORAS. *Lond.;* SUB-BORAS SODÆ. *Ed.;* SODÆ BORAS. BORAX. *Dub.*

Borax; Borate de soude, Borax, *Fr.;* Boraxsaures Natron, Borax, *Germ.;* Borace, *Ital.;* Borrax, *Span.;* Boorak, *Arab.*

Borax was known to the ancients, but its chemical nature was first ascertained by Geoffroy in 1732. It exists native, and may be obtained by artificial means. It occurs in small quantities in several localities in Europe, and in Peru in South America; but the demands of commerce are supplied almost exclusively by certain lakes, existing in Thibet and Persia, from which it is obtained by spontaneous evaporation. The impure borax concretes on the margins of these lakes, and is dug up in lumps, called in commerce *tincal* or *crude borax*. In this state it is in the form of crystalline masses, which are sometimes colourless, sometimes yellowish or greenish, and always covered with an earthy coating, greasy to the touch, and having the odour of soap. The greasy appearance is derived from a fatty matter, with which the excess of soda appears to be united. The crude borax, thus obtained in the interior, is transferred to the seaports of India, from which it is exported to this country packed in chests. Besides tincal, there is another commercial variety of borax, which comes from China, and which is partially refined. Both these kinds of borax require to be refined, before they are fit for use in medicine or the arts.

Purification. The method of refining borax was originally possessed as a secret by the Venetians and Dutch, but is now practised in several European countries. The process pursued in France, as reported by Robiquet and Marchand, is as follows. The tincal is placed in a large wooden vessel, and covered to the depth of three or four inches with water; in which state it is allowed to remain for five or six hours, agitating it from time to time. Slaked lime is now added, in the proportion of one part to four hundred of the impure salt; and the whole being mixed thoroughly, is allowed to remain at rest until the succeeding day. The salt is next separated by means of a sieve, the crystals being crumbled between the hands, and placed so as to drain. The object of this treatment is to separate the greasy matter, with which the lime forms an insoluble soap. The borax being drained is next dissolved, by the assistance of heat, in two and a half times its weight of water, and the solution treated with one-fiftieth of its weight of muriate of lime, and allowed to strain through a coarse bag. The filtration being completed, the liquor is concentrated by heat, and then run into wooden vessels, lined with lead, having the shape of an inverted quadrangular pyramid. If care be taken that the cooling proceeds very gradually, distinct crystals will be obtained, such as are found in commerce; otherwise, crystalline crusts will be formed. The washing with water in this process causes the loss of a minute portion only of the borax, the substances removed being a soapy matter, together with the sulphate and muriate of soda. The Chinese borax is purified in a similar manner, but being less impure than the common tincal, does not require to be washed. According to Berzelius, tincal, in the process of purification, loses half its weight; but according to Robiquet and Marchand, the loss is not nearly so great.

Preparation of Artificial Borax. In France of latter years borax has been made to a considerable extent by the direct combination of boracic acid with soda; and the same process is beginning to be employed by a few of our own manufacturing chemists. The acid made use of is imported from Italy, where it exists in solution in certain lakes, particularly in Tuscany. It is heated with water and carbonate of soda in excess, and the solution, after proper concentration, is allowed to crystallize in vessels lined with lead, as above described.

Properties. Borax is a white salt, generally crystallized in flattened hexahedral prisms terminated by triangular pyramids, and possessing a sweetish, feebly alkaline taste, and an alkaline reaction with test paper. It dissolves in twelve times it weight of cold, and twice its weight of boiling water. Exposed to the air, it effloresces slowly and slightly at the surface of the crystals, which become covered with a white powder. Subjected to a moderate heat it undergoes the aqueous fusion, swells considerably, and finally becomes a dry porous mass, with loss of half its weight. Above a red heat it melts into a limpid liquid, and, after cooling, concretes into a transparent solid, called *glass of borax*, which is very much used as a flux in assays with the blowpipe. According to Dr. Duncan, borax possesses the singular property of converting the mucilage of gum Arabic, of Iceland moss, or salep, into a gelatinous mass, without any adhesive property. It is decomposed by a majority of the acids, by potassa, and by the earthy and ammoniacal sulphates, muriates, phosphates, and fluates.

Borax has the property of rendering cream of tartar very soluble in water, and forms a combination with it, called *soluble cream of tartar*, which is sometimes used in medicine. This preparation is made by boiling six parts of cream of tartar and two of borax in sixteen of water for five minutes, allowing the solution to cool, and then filtering to separate some tartrate of lime. Soluble cream of tartar attracts moisture from the air, and is soluble in its own weight of cold, and half its weight of boiling water. A similar preparation may be made by substituting boracic acid for the borax; the proportions being four parts of cream of tartar to one of the acid. This combination is even more soluble than the other. It has not been well ascertained what is the nature of these compounds. Thenard has thrown out the suggestion, that the former consists of the tartrate of potassa and soda (Rochelle salt), and a combination of cream of tartar with boracic acid; and Berzelius inclines to the opinion, that in the latter the boracic acid acts the part of a base, and that the compound is a double salt, consisting of the tartrate of potassa and tartrate of boracic acid. Applying Berzelius's view to the former salt, it would consist of two double salts united together, namely the tartrate of potassa and soda, and the tartrate of potassa and boracic acid. According to the formula of the Paris Codex, soluble cream of tartar is made with boracic acid. Three parts of the acid are mixed with two parts of distilled water, and heated in a silver vessel, the mixture being stirred with a spatula. Twenty-one parts of cream of tartar are then added by small portions at a time, the mixture being constantly stirred. The whole completely liquefies, and, by a continuance of the heat until dryness is produced, passes into the state of powder. This is next thoroughly dried by the heat of a stove, and, after having been reduced to a very fine powder, is preserved in well stopped bottles.

Composition. Borax consists of two equiv. of boracic acid 69.8, and one of soda 31.3=101.1. As ordinarily crystallized it contains ten equiv. of water; but a variety of the salt exists, which crystallizes in octohedrons, and which contains only five equiv. of water. From the composition of borax in equivalents, it is evidently a *bi*borate, though generally called *sub*borate, on account of its possessing an alkaline reaction. This latter property arises from the feeble neutralizing power of boracic acid, which renders it inadequate to overcome the alkaline nature of so strong a base as soda.

Medical Properties and Uses. Borax is considered to be diuretic and emmenagogue, but is seldom used internally. Dr. Duncan quotes Wurzer for asserting that it is the best remedy that can be used in nephritic and calculous complaints, dependent on an excess of uric acid. It acts in such cases as an alkali, the boracic acid being displaced by the acid which may be met with in the stomach or urinary passages. The dose is from thirty to forty grains. Cream of tartar, rendered soluble by borax or boracic acid, is a convenient preparation, where it is desirable to administer large quantities of the former salt. The chief medical use, however, of borax, is as a detergent in aphthous affections of the mouth in children. When thus employed, it is generally applied in powder, mixed with sugar in the proportion of one part to seven, or rubbed up with honey. See *Mel Boracis*.

Off. Prep. Mel Boracis, *Lond.*, *Ed.*, *Dub.* B.

SODÆ CARBONAS VENALE.—BARILLA. *Dub.*

Commercial Carbonate of Soda.

Off. Syn. SODA IMPURA. *Lond.;* SUB-CARBONAS SODÆ IMPURUS. *Ed.*

Barilla; Soude du commerce, *Fr.;* Rohe Soda, *Germ.;* Soda impura, *Ital.;* Barilla, *Span.*

The impure carbonate of soda of commerce, or barilla, is introduced into the British Pharmacopœias, as the substance from which the pure carbonate is to be obtained by solution and crystallization. It has not a place in our national Pharmacopœia; as the purified carbonate, obtained by artificial means on a large scale by the manufacturing chemist, is sufficiently pure for medicinal use, and is the preparation found in our shops; the apothecary seldom or never resorting to any process for the purification of barilla.

The sources of the alkali soda are either natural or artificial. The natural sources are certain minerals which contain it in a carbonated state, and certain marine vegetables, which yield it by incineration; the artificial, are particular salts of soda which yield the alkali by chemical decomposition.

Native soda is found in different parts of the world; but chiefly in Egypt, in Hungary, and near Merida in the Republic of Columbia. It exists in these localities in solution in small lakes, from which it is extracted in consequence of the drying up of the water during the heats of summer. Native soda is called in commerce by the name of *natron*, and was formerly imported from Egypt for use in the arts; but for a number of years, the demands of commerce for this alkali have been supplied from other sources. The native soda of Egypt, called *trona* by the natives, proves on analysis to be a sesquicarbonate; while the South American is intermediate, in the proportion of its acid, between the Egyytian and artificial carbonate. None of these native sodas are important to the American chemist or druggist, as they are never imported into this country.

Soda of vegetable origin is derived from certain plants which grow on the the surface or borders of the sea, and is denominated either barilla or kelp, according to the particular character of the marine plants from which it is derived. *Barilla* is obtained from several vegetables, principally belonging to the genera *Salicornia* and *Salsola;* and the *Salsola soda* and *Salsola kali* are the species preferred. In Spain, Sicily, and some other countries, these plants are regularly cultivated for the purpose of yielding soda by their combustion. The plants, when mature, are cut down, dried, and burnt in excavations in the ground, about three feet deep, and four in diameter. The combustion is continued by the fresh addition of bundles of the dried plant, until the pit is filled with the ashes. These are found in the state of a semifused, hard, and compact saline mass, which is broken up into fragments by means of pickaxes, and thrown into commerce. *Kelp* is procured by the incineration of various kinds of sea-weeds, principally the algæ and fuci, which grow on the rocky coasts of many countries. The Orkney Islands, and the rocky coasts of Wales, Scotland, and Ireland, furnish large quantities of these weeds. The plants are allowed to ferment in heaps, then dried, and afterwards burnt to ashes in ovens, roughly made with brick or stone, and built in the ground. The alkali in the ashes melts, and forms the whole into one solid mass. When cold, it is broken up with iron instruments into large heavy masses, in which state it is found in commerce. Many thousand tons of kelp are thus annually made in Great Britain for the purposes of the arts.

An impure soda is obtained in a similar manner in France, under the name of *vareck.*

Properties. Barilla, when of good quality, is in hard, dry, porous, sonorous, grayish-blue masses, which become covered with a saline efflorescence after exposure to the air. It possesses an alkaline taste, but is inodorous, and should not emit any unpleasant smell on solution. It comes to this country principally from the Canary Islands. It contains from twenty-five to forty per cent. of real carbonated alkali, the residue being made up of sulphate of soda, sulphuret of sodium, common salt, carbonate of lime, alumina, silica, oxide of iron, and a small portion of charcoal which had escaped incineration.

Kelp is in hard compact masses, of a dark blue colour, and possessing a sulphureous odour, and an acrid, caustic taste. It is still less pure than barilla, containing only from three to eight per cent. of carbonated soda, the rest being made up of a large proportion of the sulphates of soda and potassa and the chlorides of potassium and sodium, and a small quantity of the iodide either of potassium or sodium. It is from kelp that iodine is most readily obtained. (See *Iodinum.*)

Preparation of the Artificial Soda of Commerce. Soda is obtained by chemical means, principally from the sulphate of soda, and the chloride of sodium or common salt. The methods pursued in Scotland for decomposing these salts are very well described by Mr. Steele, lecturer on chemistry in Glasgow, in a communication made to Dr. Duncan, from which we derive the following account. When the sulphate of soda is employed, 5 cwt. of the salt, 2 cwt. of saw-dust, 50 lbs. of lime, and a small quantity of iron-filings or borings are ground together, and then exposed to heat in a reverberatory furnace, until the mixture becomes pasty. During the calcination the sulphuric acid is decomposed; its oxygen combines with the carbon derived from the saw-dust, and forms carbonic acid, which unites with the soda; while the sulphur forms sulphurets with the lime and iron. The matter in this state is then transferred to large cisterns with double bottoms, where it is lixiviated to separate the soluble matter from the insoluble impurities. The ley obtained, consisting of a solution of carbonate of soda with a little sulphate of soda, is evaporated to dryness, and the dry mass subjected to a new treatment, precisely similar to that above described, with a view of decomposing the remains of the latter salt. The dry mass remaining after the second treatment consists of the soda, but is deficient in carbonic acid, in consequence of the strong heat to which it has been exposed. To supply this deficiency, the product is heated in a reverberatory furnace with a quantity of saw-dust, which, during its combustion, furnishes the necessary carbonic acid to the soda. The carbonate being thus completely formed, the matter from the furnace is again lixiviated, and the solution crystallized at a temperature which should not exceed 55°.

When soda is obtained from common salt, the process pursued is as follows. Saturated solutions of equal weights of common salt and pot or pearlash are mixed together and boiled to a pellicle. The common salt by solution in water becomes a muriate of soda, which, by double decomposion with the carbonate of potassa, generates carbonate of soda, and muriate of potassa in solution. This reaction having taken place, the solution is run into a cooler, and the muriate of potassa separates as chloride of potassium by priority of crystallization. The supernatant liquid containing the soda, somewhat deficient in carbonic acid owing to the deficiency of this acid in the potash, is now evaporated to dryness, and the dry mass calcined at a low red heat with saw-dust, to supply the deficient acid. It is then withdrawn from the furnace and lixiviated, and the solution crystallized at a temperature not exceeding 55°.

Sometimes soda is obtained from what are called *soaper's salts*, which are the saline matters remaining after the conversion of the alkali in kelp into hard soap. These salts consist of the sulphates and muriates of soda and potassa, and are treated in the same way as the unmixed sulphate of soda. The sulphate of soda in the mixture is of course converted into carbonate of soda, and by the operation of similar affinities, the sulphate of potassa passes into the state of a carbonate. The carbonate of potassa, as soon as formed, reacts upon the muriate of soda, and produces an additional portion of carbonate of soda. The muriate of potassa is consequently the only salt present in the soaper's salts, which remains unchanged in the process; and its quantity is somewhat increased by the decomposition of the common salt. (*Duncan, Edinb. Dispensatory.*)

The method of obtaining carbonate of soda by the decomposition of the salts of soda was first put in practice in France by Leblanc and Dizé, and has since been improved by other chemists. The process above detailed is that practised in Scotland, in which country large quantities of artificial carbonate of soda are made. The alkali, as obtained after the first calcination of the materials, is very impure, containing only from thirty-two to thirty-three per cent. of pure carbonate of soda, and may be considered as corresponding in quality to the barilla of commerce; but after being subjected to all the steps of the process, as above described, it may be considered as a pure carbonate of soda.

The carbonate of soda used in this country is chiefly imported from Scotland, and comes packed in hogsheads. The impure carbonate, in the form of barilla, is imported principally from the Canary Islands, and is consumed by the soap manufacturers. The different kinds of impure carbonate of soda of commerce, whether barilla or kelp, are exceedingly variable in composition; and as their value depends entirely on the quantity of real carbonated alkali which they contain, it becomes important to have a ready method of determining this quantity. The mode in which this is ascertained, by means of an instrument called an alkalimeter, is explained under another head. (See *Potassæ Carbonas Impurus.*)

Pharmaceutical Uses, &c. Barilla is never used in medicine, but is directed by the British Colleges for the purpose of obtaining from it the pure carbonate of soda. It is largely consumed in the arts, in the manufacture of soap and glass, and in some of the processes of dyeing.

Off. Prep. Sodæ Subcarbonas, *Lond.*, *Ed.*, *Dub.* B.

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SODÆ CARBONAS. *U.S. Dub.*

Carbonate of Soda.

Off. Syn. SODÆ SUBCARBONAS. *Lond.;* SUB-CARBONAS SODÆ. *Ed.*

Carbonate de soude, *Fr.;* Kohlensaures Natron, *Germ.;* Carbonato di soda, *Ital.;* Carbonato de soda, *Span.*

The different British Colleges give directions for the preparation of this salt from barilla by solution and crystallization; but the framers of the United States Pharmacopœia have placed it more properly in the list of the Materia Medica, as a product obtained on a large scale by the manufacturing chemist, and not made by the apothecary.

The directions of the British Colleges for the purification of barilla do not materially differ. The *London* College takes a pound of the impure salt, boils it with four pints of distilled water for half an hour, and filters. The solution is then evaporated to two pints, and set aside to crystallize. The *Edinburgh* process is the same, with the exception that the quantity of water to be used is not specified. The *Dublin* College exhausts the barilla by boiling it with twice its weight of water for two or three successive times, and, having mixed the several solutions, evaporates to dryness. The dry mass is then dissolved in boiling water, and the solution evaporated until it acquires the sp. gr. 1.22; when it is exposed to a temperature about freezing, in order that it may crystallize. The crystals are then dried and kept in close bottles.

These processes for the purification of barilla are almost entirely superseded, in consequecce of the great perfection to which the artificial production of the carbonate of soda has been brought. It is this product, made on a large scale, that supplies our apothecaries with the carbonate of soda which they vend. The manner in which it is prepared is fully detailed under the preceding article. (See *Sodæ Carbonas Venale.*)

Properties. Carbonate of soda is a white efflorescent salt, possessing an alkaline, slightly caustic taste, and crystallizing usually in large rhomboidal prisms, which are opaque and powdery on the surface, but semitransparent within. It is exceedingly soluble in water and displays an alkaline reaction with tests. When heated it undergoes the aqueous fusion at a low temperature; and if the heat be continued it dries, and finally suffers the igneous fusion. The most usual impurities which it contains are sulphate of soda and common salt, which may be detected by converting the salt into a nitrate, and testing separate portions of this severally with the nitrates of baryta and silver. Carbonate of soda is incompatible with acids, acidulous salts, lime-water, muriate of ammonia, and earthy and metallic salts. It consists of one equiv. of carbonic acid 22.12, and one of soda 31.3=53.42. When fully crystallized it contains ten equivalents of water 90, giving as the number representing the crystallized salt 143.42. It is thus perceived that this salt, when perfectly crystallized, contains nearly two-thirds of its weight of water; but the actual quantity present in it as found in the shops, is very variable, being dependent on the extent to which it may have undergone efflorescence.

Medical Properties and Uses. Carbonate of soda is antacid and deobstruent. It is given principally in diseases attended with acidity of the stomach; such as gout, uric acid gravel, and certain forms of dyspepsia. It is more frequently exhibited than carbonate of potassa, as it is more easily taken, its taste being less acrid. It has also been recommended in hooping-cough, scrofula, and bronchocele. In the latter disease, Dr. Peschier of Geneva considers it more efficacious than the iodine itself. It is given in doses of from ten grains to half a drachm, either in powder, or in solution in some bitter infusion. In consequence of the variable state in which it exists in the shops, as to the amount of water of crystallization which it contains, it is not easy to designate the dose with precision. It is on this account, that the most convenient form of the salt for administration is in the dried state. (See *Sodæ Carbonas Exsiccatus.*) It is used in preparing the precipitated carbonate of iron.

Off. Prep. Aqua Super-Carbonatis Sodæ, *Ed.*, *Dub.;* Pilulæ Ferri Compositæ, *U. S.*, *Lond.*, *Dub.;* Sodæ Bicarbonas, *U. S.*, *Lond.*, *Ed.*, *Dub.;*

Sodæ Carbonas Exsiccatus, *U. S., Lond., Dub.;* Sodæ et Potassæ Tartras, *U. S., Lond., Ed., Dub.;* Sodæ Phosphas, *U. S., Ed., Dub.* B.

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SODÆ SULPHAS. *U. S., Lond., Dub.*

Sulphate of Soda.

Off. Syn. SULPHAS SODÆ. *Ed.*

Vitriolated soda, Glauber's salt; Sulfate de soude, *Fr.;* Schwefelsaures Natron, Glaubersalz, *Germ.;* Solfato di soda, *Ital.;* Sulfato de soda, Sal de Glaubero, *Span.*

This salt is included among the Preparations by the three British Colleges, a formula for obtaining it being given; and is placed also in the catalogue of the Materia Medica by the London and Edinburgh Colleges. In the United States Pharmacopœia, it is inserted only in the Materia Medica, where it properly stands as a substance obtained on a large scale.

Sulphate of soda, in small quantities, is extensively diffused in nature, and is obtained artificially in several chemical operations. It exists in solution in many mineral springs, among which may be mentioned those of Cheltenham and Carlsbad; its ingredients are present in sea-water; and it is found combined with sulphate of lime, constituting a distinct mineral. As an artificial product, it is formed in the processes for obtaining muriatic acid and chlorine, and in the preparation of muriate of ammonia, from sulphate of ammonia and common salt. (See *Acidum Muriaticum, Aqua Chlorinii,* and *Ammoniæ Murias.*) It may also be procured, under favourable circumstances, from sea-water.

Preparation. The British Colleges agree in obtaining sulphate of soda from the salt left after the distillation of muriatic acid. This residuary salt, as is explained under muriatic acid, is sulphate of soda; but it generally contains a slight excess of sulphuric acid, which must be neutralized or removed. The *London College* dissolves two pounds of the salt in two pints and a half of boiling water, and saturates the excess of acid with carbonate of soda. The solution is then evaporated to a pellicle, filtered, and set aside to crystallize. The supernatant liquor being poured off, the crystals are dried on blotting paper. The *Edinburgh College* dissolves the salt in water, the quantity not being specified, and adds to the solution powdered carbonate of lime to neutralize the excess of acid. The solution, after being allowed to stand until the precipitate subsides, is poured off clear, filtered through paper, and evaporated to the point of crystallization. In the *Dublin* Pharmacopœia, the salt is directed to be dissolved in a sufficient quantity of boiling water, and the solution, after filtration and due evaporation, is allowed to crystallize by slow cooling.

In the above processes, it is perceived that the London College converts the excess of acid in the residuary salt into an additional portion of sulphate of soda; while the Edinburgh College gets rid of the excess, by converting it into the insoluble sulphate of lime. The latter plan is considered the best, as the London process implies the expenditure of a more valuable, to obtain a less valuable salt. The Dublin process makes no provision for removing the excess of acid, and hence the sulphate of soda obtained is slightly acid.

The residuum of the process for obtaining chlorine by the action of sulphuric acid, water, and peroxide of manganese on common salt, is a mixture of sulphate of soda and sulphate of protoxide of manganese. We have not been able to find any detailed process for separating the sulphate of soda from this mixture; but we are informed by Mr. Parkes, that an establishment for this purpose in England was attended with complete success, and was only discontinued in consequence of the Government having forbidden the sale of the residuum in question. Considering the large quantities of this residuum, which are necessarily formed in preparing chloride of lime and other bleaching agents, it would seem worth the while of our manufacturing chemists to attempt its purification. The object would not be to furnish a salt for use in medicine, but to convert the sulphate of soda which might be obtained into the carbonate. (See *Sodæ Carbonas Venale.*) For this purpose, it would probably not require to be carefully purified.

In the process for obtaining muriate of ammonia from the sulphate and common salt, water is decomposed, and a double decomposition takes place, resulting in the formation of muriate of ammonia and sulphate of soda. The mode in which the two salts are afterwards separated is explained under the head of *muriate of ammonia.*

Since the chemical method of making carbonate of soda from the sulphate has been generally practised in France and England, the consumption of Glauber's salt has considerably increased, and its preparation has been an object of importance. In France, it is usually made by decomposing common salt by sulphuric acid, and in most instances the muriatic acid is allowed to escape. This is the same process with that of the British Colleges, only performed on a large scale. In Sweden sulphate of soda is made by double decomposition between sulphate of iron and common salt. In some of our Northern States, particularly Massachusetts, a portion of Glauber's salt is made from sea-water in the winter season. The circumstances under which it is formed, have been explained in a paper "On the preparation of Glauber's and Epsom Salt and Magnesia from Sea-water," by Mr. Daniel B. Smith, published in the fourth volume of the Journal of the Philadelphia College of Pharmacy, The constituents of a number of salts exist in sea-water; and in what binary order they may precipitate during evaporation, depends on the temperature. During the prevalence of rigorous cold, sulphate of soda is the least soluble salt which can be formed out of the acids and bases present, and accordingly separates in the form of crystals.

Properties. Sulphate of soda is a white salt, possessing a cooling, nauseous, bitter taste, and crystallizing with great facility in four-sided striated prisms, with dihedral summits. When recently prepared, it is beautifully transparent; but by exposure to the air it effloresces, and the crystals become covered with an opaque white powder. By long exposure it undergoes complete efflorescence, and falls to powder with loss of more than half its weight. It is soluble in about twice its weight of cold water, and in less than one-third of its weight at 91.5°, above which temperature, up to the boiling point, its solubility diminishes. Subjected to heat, it melts in its water of crystallization, then dries, and afterwards, by the application of a pretty strong heat, undergoes the igneous fusion. Occasionally it contains an excess of acid or alkali, which may be discovered by the use of litmus or turmeric paper. The presence of common salt may be detected by sulphate of silver; that of iron by ferrocyanate of potassa or tincture of galls. It is incompatible with carbonate of potassa, muriate of lime, the salts of baryta, nitrate of silver if the solutions be strong, and the acetate and subacetate of lead. It consists of one equiv. of sulphuric acid 40.1, one of soda 31.3, and ten of water 90=161.4.

Medical Properties and Uses. Sulphate of soda, in doses of from half an ounce to an ounce, is an efficient cathartic; in smaller doses largely diluted, an aperient and diuretic. When in an effloresced state, the dose must be reduced one-half. It is much less used than formerly, having been almost entirely superseded by sulphate of magnesia, which is less disagreeable to the palate. Its nauseous taste, however, may be readily disguised by the admixture of a little lemon-juice or cream of tartar. Sulphate of soda is the principal ingredient in the artificial *Cheltenham salts.* These consist of 120 grs. of sulphate of soda, 66 grs. of sulphate of magnesia, 10 grs. of muriate of soda, and half a grain of sulphate of iron, and constitute, according to Dr. Paris, a very efficacious purgative. The only use of sulphate of soda in the arts is to make carbonate of soda, and as an ingredient in some kinds of glass. It has no officinal preparations. B.

SODII CHLORIDUM. *U.S.*

Chloride of Sodium.

Off. Syn. SODÆ MURIAS. *Lond., Dub.;* MURIAS SODÆ. *Ed.*

Muriate of soda, Common salt; Chlorure de sodium, Hydro-chlorate de soude, Sel marin, *Fr.;* Salzsaures Natron, Kochsalz, *Germ.;* Salt, *Dan., Swed.;* Sal commune, *Ital.;* Sal, *Span.*

This mineral production, so necessary to the wants of mankind, is universally distributed over the globe, and is the most abundant of the native soluble salts. Most animals have an instinctive relish for it; and from its frequent presence in the solids and fluids of the animal economy, it may be viewed as performing an important part in nutrition and assimilation.

Natural State. Common salt exists in nature, either in the solid state or in solution. In the solid state, called rock salt, it is often found forming extensive beds, and even entire mountains, from which it is extracted in blocks or masses by mining operations. Its geological position is very constant, occurring almost invariably in secondary formations, associated with clay and gypsum. In solution it occurs in certain springs and lakes, and in the waters of the ocean. The principal salt-mines in the world are found in Poland, Hungary, and Russia; in various parts of Germany, particularly the Tyrol; in England, in the county of Cheshire; in Spain; in various parts of Asia and Africa; and in Peru, and other countries of South America. In the United States there are no salt-mines, but numerous saline springs, which either flow naturally, or are produced artificially by sinking shafts to various depths, in places where salt is known to exist. These are found principally in Missouri, Kentucky, Illinois, Ohio, Pennsylvania, Virginia, and New York. In the last mentioned State the springs are the most productive; the chief ones being situated at Salina, Montezuma, and Galen. In Virginia, an important salt region exists, extending fifteen miles on each side of the great Kanawha river. The salt works in this district were estimated in 1835 to have produced two millions of bushels of salt. Rock salt is always transparent or translucent; but it often exhibits various colours, such as red, yellow, brown, violet, blue, &c., which are supposed to be derived from iron and manganese.

Extraction. Mines of salt are worked in two ways. When the salt is pure, it is merely dug out in blocks and thrown into commerce. When impure, it is dissolved in water and extracted afterwards from the solution by evaporation. When the salt is naturally in solution, the mode of extraction depends upon the strength of the brine, and the temperature of the place where it is found. When the water contains from fourteen to fifteen per cent. of salt, it is extracted by evaporation in large iron boilers. If, however, it contains only two, three, four, or five per cent., the salt is obtained in a different manner. If the climate be warm it is procured by spontaneous evaporation, effected by the heat of the sun; if temperate, by a peculiar mode of spontaneous evaporation to be mentioned presently, and the subsequent application of artificial heat.

Sea-water is a weak saline solution, from which salt is often extracted by the agency of solar heat in warm countries. Salt thus obtained, is called *bay salt*. The extraction is conducted in Europe principally on the shores of the Mediterranean, the waters of which are salter than those of the open ocean. The mode in which it is performed is by letting in the sea-water into a kind of shallow dikes, lined with clay, and capable, after being filled, of being shut off from the sea. In this situation the heat of the sun gradually concentrates the water, and the salt is deposited. In temperate climates, weak brines are first concentrated in buildings, called *graduation houses*. These are rough wooden structures, open on the sides, ten or eleven yards high, five or six wide, and three or four hundred long, and containing an oblong pile of faggots somewhat smaller than the building itself. The brine is pumped up into troughs full of holes, placed above the faggots, upon which it is allowed to fall; and in its descent it becomes minutely divided. This operation, by greatly increasing the surface of the brine, promotes its evaporation; and being repeated several times, the solution is at last brought to the requisite degree of strength, to permit of its final concentration in iron boilers by artificial heat. Sometimes, to save fuel, the last concentration is performed by allowing the brine to trickle down a number of vertical ropes, on the surface of which the salt is deposited in the form of a crust.

Properties. Chloride of sodium is white, without odour, and of a peculiar taste, called saline. It is usually crystallized in cubes; but by hasty evaporation it often assumes the form of hollow quadrangular pyramids. When pure it undergoes no change in the air; but when contaminated with muriate of magnesia, as not unfrequently happens, it is rendered deliquescent. It dissolves in somewhat less than three times its weight of cold water, and is scarcely more soluble in boiling water. In weak alcohol it is very soluble, but sparingly so in absolute alcohol. Exposed to a gradually increasing heat, it first decrepitates from the presence of interstitial moisture, next melts, and finally volatilizes in white fumes without decomposition. It is decomposed by several of the acids, particularly the sulphuric and nitric, which disengage vapours of muriatic acid; by carbonate of potassa with the assistance of heat; and by the nitrate of silver and protoxide of mercury.

Several varieties of common salt are distinguished in commerce; as *stoved salt*, *fishery salt*, *bay salt*, &c.; but they are characterized by modifications in the size and compactness of the grains, rather than by any essential difference in composition.

Composition. Common salt, in its pure state, consists of one equiv. of chlorine 35.42, and one of sodium 23.3=58.72. It contains no water of crystallization. When in solution it is supposed to become a muriate of soda in consequence of the decomposition of water, the hydrogen and oxygen of which severally convert the chlorine and sodium into muriatic acid and soda. The common salt of commerce, besides pure chloride of sodium, contains, generally speaking, insoluble matter, and usually more or less of the muriates and sulphates of lime and magnesia. The muriate of lime is generally present in very small amount; but the muriate of magnesia sometimes amounts to 28 parts in 1000. Sulphate of lime is usually present, constituting variously from 1 part to 23 in 1000; and sulphate of magnesia is sometimes present and sometimes absent. To separate the earths, a boiling solution of carbonate of soda must be added, as long as any precipitate is formed. The earths will fall as carbonates, and must be separated by filtration, and muriate and sulphate of soda will remain in solution. The sulphate of soda may then be decomposed by the cautious addition of muriate of baryta, which will generate muriate of soda, and the insoluble sulphate of baryta.

Medical Properties and Uses. Chloride of sodium, in small doses, acts as a stimulant tonic; in larger doses, as a purgative. It certainly promotes digestion, and the almost universal animal appetency for it, proves it to be a salutary stimulus in health. When taken in larger quantities than usual with food, it is useful in some forms of dyspepsia, and by giving greater tone to the digestive organs in weakly children, may correct the disposition to generate worms. On the sudden occurrence of hæmoptysis, it is usefully resorted to as a styptic, in the dose of a teaspoonful, taken dry, and often proves successful in stopping the flow of blood. Externally applied in solution it is stimulant, and may be used either locally or generally. Locally it is sometimes employed as a fomentation in sprains and bruises; and as a general external application, it forms the salt water bath, a valuable remedy as a tonic and excitant in depraved conditions of the system, occurring especially in children, and supposed to be dependent on the scrofulous diathesis. It is frequently used as an ingredient in stimulating enemata. The dose, as a tonic, is from ten grains to a drachm; as a cathartic, though seldom used for this purpose, from half an ounce to an ounce. When employed as a clyster, it may be used in the amount of from one to two tablespoonfuls dissolved in a pint of water.

The uses of common salt in domestic economy as a condiment and antiseptic are well known. In agriculture it is sometimes used as a manure, and in the arts it is employed to prepare artificial soda and muriate of ammonia. In pharmacy it is used in the processes for obtaining muriatic acid, chlorine, calomel, and corrosive sublimate.

Off. Prep. Acidum Muriaticum, *Lond.*, *Ed.*, *Dub.;* Aqua Chlorinii, *Dub.;* Hydrargyri Chloridum Corrosivum, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Hydrargyri Chloridum Mite, *U.S.*, *Lond.*, *Dub.;* Pulvis Salinus Compositus, *Ed.*, *Dub.;* Sub-Murias Hydrargyri Præcipitatus, *Ed.*, *Dub.* B.

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SOLIDAGO. *U.S. Secondary.*

Golden-rod.

"Solidago odora. Folia. *The leaves.*" *U. S.*

Solidago. *Sex. Syst.* Syngenesia Superflua.—*Nat. Ord.* Compositæ Corymbiferæ.

Gen. Ch. *Calyx* imbricated, scales closed. *Radial florets* about five, yellow. *Receptacle* naked, punctate. *Pappus* simple pilose. *Nuttall.*

This is a very abundant genus, including, according to Eaton's enumeration, upwards of sixty species belonging to this country. Of these the *S. odora* only is officinal. The *S. Virgaurea*, which is common to the United States and Europe, was formerly directed by the Dublin College; but was omitted in the last edition of their Pharmacopœia. It is astringent, and has been supposed to possess lithontriptic virtues.

Solidago odora. Willd. *Sp. Plant.* iii. 2061; Bigelow, *Am. Med. Bot.* i. 187. The *sweet-scented golden-rod* has a perennial creeping root, and a slender, erect, pubescent stem, which rises two or three feet in height. The leaves are sessile, linear lanceolate, entire, acute, rough at the margin, elsewhere smooth, and, according to Bigelow, covered with pellucid dots. The flowers are of a deep golden-yellow colour, and are arranged in a terminal, compound, panicled raceme, the branches of which spread almost horizontally, are each accompanied by a small leaf, and support the flowers on downy pedicels, which put forth from the upper side of the peduncle, and have small linear bractes at their base. The florets of the ray are ligulate, oblong, and obtuse; those of the disk funnel-shaped, with acute segments.

The plant grows in woods and fields throughout the United States, and is in flower from August to October. The leaves, which are the officinal portion, have a fragrant odour, and a warm, aromatic, agreeable taste. These properties depend on a volatile oil, which may be separated by distillation with water. It is of a pale greenish-yellow colour, and lighter than water.

Medical Properties and Uses. Golden-rod is aromatic, moderately stimulant and carminative, and like other substances of the same class, diaphoretic when given in warm infusion. It may be used to relieve pain arising from flatulence, to allay nausea, and to cover the taste or correct the operation of unpleasant or irritating medicines. For these purposes it may be given in infusion. The volatile oil dissolved in alcohol is employed in the Eastern States. According to Pursh, the dried flowers are used as a pleasant and wholesome substitute for common tea. W.

SPARTIUM. *U.S. Secondary.*

Broom.

" Spartium scoparium. Cacumina. *The tops.*" *U. S.*

Off. Syn. SPARTII CACUMINA. Spartium scoparium. Cacumina. *Lond.;* SPARTII SCOPARII SUMMITATES. *Ed.;* SPARTIUM SCOPARIUM. Cacumina. *Dub.*

Genet a balais, *Fr.;* Gemeine Besenginster, Pfriemén, *Germ.;* Scoparia, *Ital.;* Retama, *Span.*

Spartium. *Sex. Syst.* Diadelphia Decandria.—*Nat. Ord.* Leguminosæ.

Gen. Ch. *Stigma* longitudinal, villous above. *Filaments* adhering to the germen. *Calyx* produced downwards. *Willd.*

Spartium scoparium. Willd. *Sp. Plant.* iii. 933; Woodv. *Med. Bot.* p. 413. t. 150. This is a common European shrub, cultivated in our gardens, from three to eight feet high, with numerous straight, pentangular, bright-green, very flexible branches, and small, oblong, downy leaves, which are usually ternate, but on the upper part of the plant are sometimes simple. The flowers are numerous, papilionaceous, large, showy, of a golden-yellow colour, and supported solitarily upon short axillary peduncles. The seeds are contained in a compressed legume, which is hairy at the sutures.

The whole plant has a bitter nauseous taste, and when bruised, a strong peculiar odour. The tops of the branches are the officinal portion; but the seeds are also used, and possess similar virtues. Water and alcohol extract their active properties.

Medical Properties and Uses. Broom is diuretic and cathartic, and has been employed with some advantage in dropsical complaints, in which it was recommended by Mead, Cullen, and others. Cullen prescribed it in the form of decoction, made by boiling half an ounce of the fresh tops in a pint of water down to half a pint, of which he gave a fluidounce every hour till it operated by stool or urine. It is a domestic remedy in Great Britain, but is seldom used in this country.

Off. Prep. Extractum Spartii Scoparii, *Dub.* W.

SPIGELIA. *U. S.*

Pink-root.

"Spigelia Marilandica. Radix. *The root.*" *U. S.*

Off. Syn. SPIGELIÆ RADIX. Spigelia Marilandica. Radix. *Lond.;* SPIGELIÆ MARILANDICÆ RADIX. *Ed.;* SPIGELIA MARILANDICA. Radix. *Dub.*

Spigélie du Maryland, *Fr.;* Spigelie, *Germ.;* Spigelia, *Ital.*

SPIGELIA. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Gentianæ, *Juss.;* Spigeliaceæ, *Martius, Lindley.*

Gen. Ch. *Calyx* five-parted. *Corolla* funnel-shaped, border five-cleft, equal. *Capsule* didymous, two-celled, four-valved, many-seeded. *Nuttall.*

There are two species of Spigelia which have attracted attention as anthelmintics, the *S. anthelmintica* of South America and the West Indies, and the *S. Marilandica* of this country. The former is an annual plant, used only in the countries where it grows, the latter is much employed both in this country and in Europe.

Spigelia Marilandica. Willd. *Sp. Plant.* i. 825; Bigelow, *Am. Med. Bot.* i. 142; Barton, *Med. Bot.* ii. 75. The *Carolina pink* is an herbaceous plant with a perennial root, which sends off numerous fibrous branches. The stems, several of which rise from the same root, are simple, erect, four-sided, nearly smooth, and from twelve to twenty inches high. The leaves are opposite, sessile, ovate lanceolate, acuminate, entire, and smooth, with the veins and margins slightly pubescent. Each stem terminates in a spike, which leans to one side and supports from four to twelve flowers with very short peduncles. The calyx is persistent, with five long, subulate, slightly serrate leaves, reflexed in the ripe fruit. The corolla is funnel-shaped, and much longer than the calyx, with the tube inflated in the middle, and the border divided into five acute, spreading segments. It is of a rich carmine colour externally, becoming paler at the base, and orange-yellow within. The edges of the segments are slightly tinged with green. The stamens, though apparently very short, and inserted into the upper part of the tube between the segments, may be traced down its internal surface to the base. The anthers are oblong, heart-shaped; the germ superior, ovate; the style about the length of the corolla, and terminating in a linear fringed stigma projecting considerably beyond it. The capsule is double, consisting of two cohering, globular, one-celled portions, and containing many seeds.

The plant is a native of our Southern States, being seldom if ever found North of the Potomac. It grows in rich soils on the borders of woods, and flowers from May to July. The root is the part recognised as officinal in the United States Pharmacopœia, although the whole plant is gathered and dried for sale. It is collected by the Creek and Cherokee Indians, who dispose of it to the white traders. By these it is packed in casks, or more commonly in large bales, weighing from three hundred to three hundred and fifty pounds. That contained in casks is to be preferred, as less liable to be damp and mouldy. Owing to the imperfect manner in which the plant is dried, it seldom happens that packages of it reach the market free from dirt and mouldiness, and having the stalks of a bright colour. Parcels have sometimes been brought free from the stalks, and have commanded more than double the price of the drug prepared in the usual way.

Properties. Pink-root consists of numerous slender, branching, crooked, wrinkled fibres, from three to six inches long, attached to a knotty head or caudex, which exhibits traces of the stems of former years. It is of a brownish or yellowish-brown colour externally, of a faint smell, and a sweetish, slightly bitter, not very disagreeable taste. Its virtues are extracted by boiling water. The root, analyzed by M. Feneulle, yielded a fixed and volatile oil, a small quantity of resin, a bitter substance supposed to be the active principle, a mucilaginous saccharine matter, albumen, gallic acid, the malates of potassa and lime, &c., and woody fibre. The principle upon which the virtues of the root are thought to depend, is brown, of a bitter nauseous taste like that of the purgative matter of the leguminous plants, and when taken internally produces vertigo and a kind of intoxication.

The stalks, which, with the leaves, are usually attached to the root, are oval below the first pair of leaves, and then become obscurely four-sided. The leaves, when good, have a fresh greenish colour, and an odour somewhat like that of tea. In taste they resemble the root, and afforded to M. Feneulle nearly the same principles. The quantity, however, of the bitter substance was less, corresponding with their inferior efficacy. This circumstance should cause their rejection from the shops, as the inequality in power of the two portions of the plant would lead to uncertainty in the result, when they are both employed. The root alone is wisely directed by the Pharmacopœias.

The roots are sometimes mixed with those of other plants, particularly of a small vine which twines round the stem of the Spigelia. These are long, slender, crooked, yellowish, thickly set with short capillary fibres, and much smaller and lighter coloured that the pink-root. They should be separated before the latter is used. The activity of spigelia is somewhat diminished by time.

Medical Properties and Uses. Pink-root is generally considered among the most powerful anthelmintics. In the ordinary dose it usually produces little sensible effect on the system; more largely given it acts as a cathartic, though unequal and uncertain in its operation; in overdoses it excites the circulation, and determines to the brain, giving rise to vertigo, dimness of vision, dilated pupils, spasm of the facial muscles, and sometimes even to general convulsions. Spasmodic movements of the eyelids have been observed among the most common attendants of its narcotic action. The death of two children who expired in convulsions was attributed by Dr. Chalmers to the influence of spigelia. The narcotic effects are said to be less apt to occur when the medicine purges, and to be altogether obviated by combining it with cathartics. The danger from its employment cannot be great, as it is in very general use in the United States, both in regular and domestic practice, and we never hear at present of serious consequences. Its effects upon the nervous system have been erroneously conjectured to depend on other roots sometimes mixed with the genuine. The vermifuge properties of spigelia were first learned from the Cherokee Indians. They were made known to the medical profession by Drs. Lining, Garden, and Chalmers of South Carolina. The remedy stands at present in this country at the head of the anthelmintics. It has also been recommended in infantile remittents and other febrile diseases; but is entitled to little confidence in these complaints.

It may be given in substance or infusion. The dose of the powdered root for a child three or four years old, is from ten to twenty grains, for an adult from one to two drachms, to be repeated morning and evening for several days successively, and then followed by a brisk cathartic. The practice of preceding its use by an emetic has been generally abandoned. It is frequently given in combination with calomel. The infusion, however, is the most common form of administration. (See *Infusum Spigeliæ.*) It is usually combined with senna or some other cathartic, to ensure its action on the bowels. A preparation generally kept in the shops and much prescribed by physicians, under the name of *worm tea*, consists of pink-root, senna, manna, and savine, mixed together, in various proportions, to suit the views of different individuals.

Off. Prep. Infusum Spigeliæ, *U.S.* W.

SPIRÆA. *U.S. Secondary.*

Hardhack.

"Spiræa tomentosa. Radix. *The root.*" *U.S.*

SPIRÆA. *Sex. Syst.* Icosandria Pentagynia.—*Nat. Ord.* Rosaceæ.

Gen. Ch. *Calyx* spreading, five-cleft, inferior. *Petals* five, equal, roundish. *Stamens* numerous, exserted. *Capsules* three to twelve, internally bivalve, each one to three-seeded. *Nuttall.*

Spiræa tomentosa. Willd. *Sp. Plant.* ii. 1056; Rafinesque, *Med. Flor.* vol. ii. This is an indigenous shrub, two or three feet high, with numerous simple, erect, round, downy, and purplish stems, furnished with alternate leaves closely set upon very short footstalks. The leaves are ovate lanceolate, unequally serrate, somewhat pointed at both ends, dark green on their upper surface, whitish and tomentose beneath. The flowers are of a beautiful red or purple colour, and disposed in terminal, compound, crowded spikes or racemes.

The hardhack flourishes in low grounds, from New England to Carolina, but is most abundant in the Northern States. It flowers in July and August. All parts of it are medicinal. The root, though designated in the Pharmacopœia, is, according to Dr. A. W. Ives, the least valuable portion. The taste of the plant is bitter and powerfully astringent. Among its constituents are tannin, gallic acid, and bitter extractive. Water extracts its sensible properties and medicinal virtues.

Medical Properties and Uses. Spiræa is tonic and astringent, and may be used in diarrhœa, cholera infantum, and other complaints in which astringents are indicated. In consequence of its tonic powers it is peculiarly adapted to cases of debility; and, from the same cause, should not be given during the existence of inflammatory action, or febrile excitement. It is said to have been employed by the aborigines of our country; but was first brought before the notice of the medical profession by Dr. Cogswell of Hartford, in Connecticut. It is said to be less apt to disagree with the stomach than most other astringents.

The form in which it is best administered is that of an extract, prepared by evaporating the decoction of the leaves, stems, or root. The dose is from five to fifteen grains, repeated several times a day. A decoction prepared by boiling an ounce of the plant in a pint of water, may be given in the dose of one or two fluidounces. W.

SPONGIA. *U.S., Lond.*

Sponge.

"Spongia officinalis." *U.S.*

Off. Syn. SPONGIA OFFICINALIS. *Ed., Dub.*

Eponge, *Fr.;* Badeschwamm, *Germ.;* Spugna, *Ital.;* Esponja, *Span., Portug.;* Isfung, *Arab.*

The sponge is now universally admitted to be an animal belonging to the class of Zoophites. It is characterized as "a flexile, fixed, torpid, polymorphous animal, composed either of reticulate fibres, or masses of small spires interwoven together, and clothed with a gelatinous flesh full of small mouths on its surface, by which it absorbs and ejects water." More than two hundred and fifty species have been described by naturalists, of which several are probably employed, though the *Spongia officinalis* is the only one designated in the Pharmacopœias. They inhabit the bottom of the sea, where they are fixed to rocks or other solid bodies; and are most abundant within the tropics. They are collected chiefly in the Mediterranean and Red Seas, and in those of the East and West Indies. In the Grecian Archipelago many persons derive their support altogether from diving for sponges. When first collected they are enveloped in a gelatinous coating, which forms part of the animal, and is separated by washing with water. Large quantities of the coarser kinds are imported from the Bahamas; but the finest and most esteemed are brought from the Mediterranean.

Sponge, as found in commerce, is in yellowish-brown masses of various shape and size, light, porous, elastic, and composed of fine, flexible, tenacious fibres, interwoven in the form of cells and meshes. It usually contains numerous minute fragments of coral or stone, or small shells, from which it must be freed before it can be used for ordinary purposes. Sponge is prepared by macerating it for several days in cold water, beating it in order to break up the concretions which it contains, and dissolving what cannot thus be separated of the calcareous matter by muriatic acid diluted with thirty parts of water. By this process, it is rendered perfectly soft, and fit for surgical use. It may be bleached by steeping it in water impregnated with sulphurous acid, or by exposure in a moist state to the action of chlorine. When intended for surgical purposes, the softest, finest, and most elastic sponges should be selected; for forming *burnt sponge*, the coarser will answer equally well.

According to Mr. Hatchett, the chemical constituents of sponge are gelatin, albumen, common salt, and carbonate of lime. The presence of magnesia, silica, iron, and phosphorus has also been detected; and iodine, in the state of hydriodate of soda, is among the ingredients.

Medical Properties and Uses. Sponge, in its unaltered state, is not employed as a medicine; but in consequence of its softness, porosity, and property of imbibing liquids, it is very useful in surgical operations. From the same qualities it may be advantageously applied over certain ulcers, the irritating sanies from which it removes by absorption. Compressed upon a bleeding vessel, it is sometimes useful for promoting the coagulation of the blood, especially in hemorrhage from the nostrils. In the shape of sponge tent it is also useful for dilating sinuses. This is prepared by dipping sponge into melted wax, compressing it between two flat surfaces till the wax hardens, and then cutting it into pieces of a proper form and size. By the heat of the body the wax becomes soft, and the sponge expanding by the imbibition of moisture, gradually dilates the wound or ulcer in which it may be placed. Reduced to the state of charcoal by heat, sponge has long been used as a remedy in goitre. (See *Spongia Usta.*) Its efficacy in this complaint, which was formerly considered very doubtful by many physicians, has been generally admitted since the discovery of iodine.

Off. Prep. Spongia Usta, *U.S., Lond., Dub.* W.

* * *

STANNUM. *U.S., Lond., Dub.*

Tin.

Off. Syn. STANNI LIMATURA. *Ed.*

Etain, *Fr.;* Zinn, *Germ.;* Stagno, *Ital.;* Estanno, *Span.*

Tin is one of those metals which have been known from the earliest ages. It exists in the earth generally as an oxide, rarely as a sulphuret, and is by no means generally diffused. It is found in England, Spain, Germany, Bohemia, and Hungary, in Europe; in the island of Banca and the peninsula of Malacca in Asia; and in Chili and Mexico in America. It has not been discovered in the United States. The English mines are the most productive, but those of Asia furnish the purest tin. The metal is extracted exclusively from the native oxide. When this occurs in its purest state, under the form of detached roundish grains, called *stream tin*, the reduction is effected simply by heating with charcoal. When the oxide is extracted from mines, it requires to be freed, by pounding and washing, from the adhering gangue; after which it is roasted to drive off sulphur, arsenic, and antimony, and finally reduced in furnaces by means of stone coal. The metal, as thus obtained, is not pure, and requires to be subjected to a gentle heat, whereby the pure tin enters first into fusion, and is thus separated from the impurities, which consist of tin united with copper, arsenic, iron, and antimony. The pure metal, thus obtained, is the *grain-tin* of the English; while the impure residue, after being fused, constitutes *ordinary* or *block-tin.*

Properties. Tin is a malleable, rather soft metal, of a silver-white colour, and possessing considerable brilliancy. It undergoes but a slight tarnish in the air. Its taste is slight, and when rubbed it exhales a peculiar smell. Its ductility and tenacity are small, and when bent to and fro, it emits a crackling noise, which is characteristic of this metal. Its sp. gr. is 7.29, melting point 442°, and equiv. number 57.9. It forms three oxides, a protoxide, sesquioxide, and deutoxide. The *protoxide* is of a grayish-black colour, and consists of one equiv. of tin 57.9 and one of oxygen 8=65.9. The *sesquioxide* is gray, and is composed of two equiv. of tin 115.8, and three of oxygen 24=139.8. The *deutoxide* is of a white colour, and constitutes the native oxide. It consists of one equiv. of tin 57.9 and two of oxygen 16=73.9

The tin of commerce is often impure, being contaminated with other metals, either by fraud, or in consequence of the mode of extraction from the ore. When its colour has a bluish or grayish cast, the presence of copper, lead, iron, or antimony, may be suspected. Arsenic renders it whiter, but at the same time harder than natural; and lead, copper, and iron, cause it to become brittle. Pure tin, dissolved in nitro-muriatic acid, gives a white precipitate with ferrocyanate of potassa. A blue precipitate with this test indicates iron; a purple one, copper; and a violet-blue one, both iron and copper. If lead be present, a precipitate will be produced by sulphate of soda. The Malacca and Banca tin, and the English grain-tin, are the purest kinds found in commerce. Block tin and the metal obtained from Germany are always of inferior quality.

Uses. Tin enters into the composition of bronze, bell-metal, pewter, and plumbers' solder. It is used also in making tin-plate, in silvering looking-glasses, and in forming the muriate of tin, a combination essential to the perfection of the scarlet dye. It is employed in fabricating various vessels and instruments, useful in domestic economy and the arts. Being unaffected by weak acids, it forms a good material for vessels intended for boiling operations in pharmacy. For its medical properties, see *Pulvis Stanni.*

Off. Prep. Pulvis Stanni, *U.S.*, *Ed.*, *Dub.* B.

STAPHISAGRIÆ SEMINA. *Lond.*

Stavesacre seeds.

"Delphinium Staphisagria. *Semina.*" *Lond.*

Off. Syn. DELPHINII STAPHISAGRIÆ SEMINA. *Ed.;* DELPHINIUM STAPHISAGRIA. Semina. *Dub.*

Staphisaigre, *Fr.;* Stephanskraut, Läusekraut, *Germ.;* Stafisagria, *Ital.;* Abarraz, *Span.*

Delphinium. See DELPHINIUM.

Delphinium Staphisagria. Willd. *Sp. Plant.* ii. 1231.; Woodv. *Med. Bot.* p. 471. t. 168. Stavesacre is a handsome annual or biennial plant, one or two feet high, with a simple, erect, downy stem, and palmate, five or seven-lobed leaves supported on hairy footstalks. The flowers are bluish or purple, in terminal racemes, with pedicels twice as long as the flower, and bracteoles inserted at the base of the pedicel. The nectary is four-leaved and shorter than the petals, which are five in number, the uppermost projected backward so as to form a spur which encloses two spurs of the upper leaflets of the nectary. The seeds are contained in straight, oblong capsules. The plant is a native of the South of Europe.

Properties. Stavesacre seeds are large, irregularly triangular, wrinkled, externally brown, internally whitish and oily. They have a slight but disagreeable odour, and an extremely acrid, bitter, hot, nauseous taste. Their virtues are extracted by water and alcohol. Analyzed by MM. Lassaigne and Feneulle, they yielded a brown and a yellow bitter principle, a volatile oil, a fixed oil, albumen, an azotized substance, a mucilaginous saccharine matter, mineral salts, and a peculiar vegetable alkali called *delphine* or *delphia*, which exists in the seeds combined with an excess of malic acid. It is white, pulverulent, inodorous, of a bitter acrid taste, fusible by heat and becoming hard and brittle upon cooling, slightly soluble in cold water, very soluble in alcohol and ether, and capable of forming salts with the acids. It is obtained by boiling a decoction of the seeds with magnesia, collecting the precipitate, and treating it with alcohol, which dissolves the *delphia* and yields it upon evaporation. According to M. Couerbe, this substance consists of three distinct principles,—one of a resinous nature separated from its solution in diluted sulphuric acid by the addition of nitric acid, another distinguished by its insolubility in ether, and named by M. Couerbe, *staphisain*, and the third soluble both in alcohol and ether, and deserving to be considered as pure *delphia.* (*Journ. de Pharm.* xix. 519.)

Medical Properties and Uses. The seeds were formerly used as an emetic and cathartic, but have been abandoned in consequence of the violence of their action. Powdered and mixed with lard they are employed in some cutaneous diseases, and to destroy lice in the hair. An infusion in

vinegar has been applied to the same purpose. In some countries the seeds are used to intoxicate fish in the same manner as the Cocculus Indicus. Delphia is highly poisonous in small doses, exerting its effects chiefly on the nervous system.
W.

STATICE. *U.S. Secondary.*

Marsh Rosemary.

"Statice Caroliniana. Radix. *The root.*" *U. S.*

STATICE. *Sex. Syst.* Pentandria Pentagynia.—*Nat. Ord.* Plumbagineæ.

Gen. Ch. *Calyx* one-leaved, entire, plaited, scariose. *Petals* five. *Seed* one, superior. *Nuttall.*

Statice Caroliniana. Walter, *Flor. Car.* 118; Bigelow, *Am. Med. Bot.* ii. 51. This is considered by Nuttall, Torrey, and some other botanists, as a mere variety of the *Statice Limonium* of Europe. Pursh, Bigelow, and others follow Walter in considering it as a distinct species. It is an indigenous maritime plant, with a perennial root, sending up annually tufts of leaves, which are obovate or cuneiform, entire, obtuse, mucronate, smooth, and supported on long footstalks. They differ from the leaves of the *S. Limonium* in being perfectly flat on the margin, while the latter are undulated. The flower-stem is round, smooth, from a few inches to a foot or more in height, sending off near its summit numerous alternate subdividing branches, which terminate in spikes, and form altogether a loose panicle. The flowers are small, bluish-purple, erect, upon one side only of the common peduncle, with a mucronate scaly bracte at the base of each, a five-angled, five-toothed calyx, and spatulate, obtuse petals.

The marsh rosemary grows in the salt marshes along the seacoast, from New England to Florida, and flowers in August and September. The root, which is the officinal portion, is large, spindle-shaped or branched, fleshy, compact, rough, and of a purplish-brown colour. To the taste it is bitter and extremely astringent, but is without odour. It contains abundance of tannin and gallic acid, with extractive matter and some common salt. Water extracts its virtues.

Medical Properties and Uses. Statice is powerfully astringent, and in some parts of the United States, particularly in New England, is much employed. It may be used for all the purposes for which kino and catechu are given; but its chief popular application is to aphthous and ulcerative affections of the mouth and fauces. Dr. Baylies of Massachusetts found it highly useful in cynanche maligna, both as an internal and local remedy. It is employed in the form of infusion or decoction.
W.

STILLINGIA. *U. S. Secondary.*

Queen's-root.

"Stillingia sylvatica. Radix. *The root.*" *U. S.*

STILLINGIA. *Sex. Syst.* Monœcia Monadelphia.—*Nat. Ord.* Euphorbiaceæ.

Gen. Ch. MALE. *Involucre* hemispherical, many-flowered, or wanting. *Calyx* tubular, eroded. *Stamens* two and three, exserted. FEMALE. *Calyx* one-flowered, inferior. *Style* trifid. *Capsule* three-grained. *Nuttall.*

Stillingia sylvatica. Willd. *Sp. Plant.* iv. 588. This is an indigenous, perennial plant, with herbaceous stems, and alternate, sessile, oblong or lanceolate oblong, obtuse, serrulate leaves, tapering at the base, and accompanied with stipules. The male and female flowers are distinct upon the same plant. They are yellow, and arranged in the form of a spike, of which the upper part is occupied by the male, the lower by the female flowers. The male florets are scarcely longer than the bracteal scales.

The plant grows in pine barrens, from Virginia to Florida, flowering in May and June. When wounded, it emits a milky juice. The root, which is the part used, is large, thick, and woody. We are not acquainted with its precise properties; but understand that it is much employed in the Southern States. It is said to be purgative and alterative; and probably possesses more or less of the acrid quality common to the Euphorbiaceæ. It is used in lues venerea, obstinate cutaneous affections, and other complaints which are usually treated with sarsaparilla. W.

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STRAMONII FOLIA. *U.S.*

Thorn-apple Leaves.

STRAMONII SEMEN. *U.S.*

Thorn-apple Seed.

"Datura stramonium. Folia. Semina. *The leaves and seeds.*" *U.S.*

Off. Syn. STRAMONII SEMINA ET FOLIA. Datura Stramonium. Semina et Folia. *Lond.;* DATURÆ STRAMONII HERBA. *Ed.;* STRAMONIUM. DATURA STRAMONIUM. Herba. Semina. *Dub.*

Stramoine, Pomme épineuse, *Fr.;* Stechapfel, *Germ.;* Stramonio, *Ital.;* Estramonio, *Span.*

Datura. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Solaneæ.

Gen. Ch. Corolla funnel-shaped, plaited. *Calyx* tubular, angular, deciduous. *Capsule* four-valved. *Willd.*

Datura Stramonium. Willd. *Sp. Plant.* i. 1008; Bigelow, *Am. Med. Bot.* i. 17; Woodv. *Med. Bot.* p. 197. t. 74. The thorn-apple is an annual plant, of rank and vigorous growth, usually about three feet high, but in a very rich soil sometimes rising six feet or more. The root is large, whitish, and furnished with numerous fibres. The stem is erect, round, smooth, somewhat shining, simple below, dichotomous above, with numerous spreading branches. The leaves, which stand on short round footstalks in the forks of the stem, are five or six inches long, of an ovate triangular form, irregularly sinuated and toothed at the edges, unequal at the base, of a dark-green colour on the upper surface, and pale beneath. The flowers are large, axillary, solitary, and peduncled: having a tubular, pentangular, five-toothed calyx, and a funnel-shaped corolla with a long tube, and a waved plaited border, terminating in five acuminate teeth. The upper portion of the calyx falls with the deciduous parts of the flower, leaving its base, which becomes reflexed, and remains attached to the fruit. This is a large, fleshy, roundish ovate, four-valved, four-celled capsule, thickly covered with sharp spines, and containing numerous seeds attached to a longitudinal receptacle in the centre of each cell. It opens at the summit.

Dr. Bigelow describes two varieties of this species of Stramonium, one with green stems and white flowers; the other with a dark reddish stem, minutely dotted with green, and purplish flowers striped with deep purple on the inside. The latter variety, however, is considered by most botanists as a distinct species, being the *D. Tatula* of Linn. The properties of both are the same.

It is doubtful to what country this plant originally belonged. Many European botanists refer it to North America, while we in return trace it to the old continent. Nuttall considers it as having originated in South America or in Asia; and it is probable that its native country is to be found in some portion of the East. Its seeds being retentive of life and easily germinating, are taken in the earth put on shipboard for ballast from one country to another, not unfrequently springing up upon the passage, and thus propagating the plant in all regions which have any commercial connexion. In the United States it is found everywhere in the vicinity of cultivation, frequenting dung-heaps, the road-sides and commons, and other places where a rank soil is created by the deposited refuse of towns and villages. Its flowers appear from May to July or August, according to the latitude. Where the plant grows abundantly, its vicinity may be detected by the rank odour which it diffuses to some distance around. All parts of it possess medicinal properties. The herbaceous portion is directed by the Edinburgh College; the herb and seeds by that of Dublin; and the leaves and seeds by the Pharmacopœias of the United States and of London. The leaves may be gathered at any time from the appearance of the flowers till the autumnal frost. In the common language of this country, the plant is most known by the name of *Jamestown weed*, derived probably from its having been first observed in the neighbourhood of that old settlement in Virginia.

1. The *fresh leaves* when bruised emit a fetid narcotic odour, which they ose upon drying. Their taste is bitter and nauseous. These properties, ogether with their medical virtues, are imparted to water and alcohol. Water distilled from them, though possessed of their odour in a slight degree, is destitute of their active properties. They contain, according to Promnitz, 0.58 per cent. of gum, 0.6 of extractive, 0.64 of green starch, 0.15 of albumen, 0.12 of resin, 0.23 of saline matters, 5.15 of lignin, and 91.25 of water.

2. The *seeds* are small, kidney-shaped, flattened on the sides, of a dark rown almost black colour, inodorous, and of the bitter nauseous taste of the eaves, with some degree of acrimony. They were minutely analyzed by Brandes, who found, besides a peculiar alkaline principle called *daturia*, a lutinous matter, albumen, gum, a butyraceous substance, green wax, resin nsoluble in ether, fixed oil, bassorin, sugar, gummy extractive, orange-oloured extractive, and various saline and earthy substances. *Daturia* exists n the seeds combined with an excess of malic acid. In its pure state it is rystallizable in the form of acicular prisms, nearly insoluble in water and old alcohol, soluble in boiling alcohol, and capable of neutralizing the acids. s salts are very soluble; and the sulphate, muriate, and nitrate are crystalzable. It is said to produce upon the system narcotic effects similar to those stramonium, but has hitherto been little used. To obtain it, the seeds are iled in alcohol, the alcoholic solution treated with magnesia, and the prepitate submitted to the action of boiling alcohol, which yields the daturia on cooling, and still further by evaporation. Mr. Simes of Philadelphia peated the process of Brandes, adding the magnesia while the liquor was ll hot, and treating the last alcoholic solution with animal charcoal before bmitting it to evaporation. He obtained crystals of a substance which he und to be slightly bitter and acrid, and to possess the other properties menned as belonging to daturia. He experienced headach to a violent degree

after tasting its salts; and killed a small cat with four grains of the muriate. Mr. Simes treated the green and dried leaves in the same manner as the seeds. From the former he obtained no crystals, from the latter a crystalline deposite, but so small in quantity that he could not determine its properties. (*Journ. of the Phil. Col. of Pharm.* v. 114.) Berzelius states that this salifiable base has been ascertained by other chemists, and even by Brandes himself, to be nothing more than the phosphate of magnesia. (*Traité de Chimie*, vi. 319.)

Medical Properties and Uses. Stramonium is a powerful narcotic. When taken in quantities sufficient to affect the system moderately, it usually produces more or less cerebral disturbance, indicated by vertigo, headach, dimness or perversion of vision, and confusion of thought, sometimes amounting to slight delirium or a species of intoxication. At the same time peculiar deranged sensations are experienced about the fauces, œsophagus, and trachea, increased occasionally to a feeling of suffocation, and often attended with nausea. A disposition to sleep is sometimes, but not uniformly produced. The pulse is not materially affected. The bowels are rather relaxed than confined, and the secretions from the skin and kidneys not unfrequently augmented. These effects pass off in five or six hours, or in a shorter period, and no inconvenience is subsequently experienced. (*Marcet, Gredding*, &c.) Taken in poisonous doses, the narcotic produces cardialgia, excessive thirst, nausea and vomiting, a sense of strangulation, anxiety and faintness, partial or complete blindness with dilatation of the pupil, vertigo, delirium sometimes of a furious sometimes of a whimsical character, tremors of the limbs, palsy, and ultimately stupor and convulsions. From all these symptoms the patient may recover; but in numerous instances they have terminated in death. To evacuate the stomach by emetics or the stomach pump is the most effectual means of affording relief.

Though long known as a poisonous and intoxicating herb, stramonium was first introduced into regular practice by Baron Störck of Vienna, who found some advantage from its use in mania and epilepsy. Subsequent observation has confirmed his estimate of the remedy; and numerous cases are on record in which benefit has accrued from it in these complaints. It can be of use, however, only in those cases which depend solely on irregular nervous action. Other diseases in which it has been found beneficial are neuralgic and rheumatic affections, syphilitic pains, cancerous sores, and spasmodic asthma. In the last complaint it has acquired considerable reputation. It is employed only during the paroxysm, which it very often greatly alleviates or altogether subverts. The practice was introduced into Great Britain from the East Indies, where the natives are in the habit of smoking the dried root and lower part of the stem of the *Datura ferox*, in the paroxysms of this distressing complaint. The same parts of the *D. Stramonium* were substituted and found equally effectual. To prepare the roots for use, they are quickly dried, cut into pieces, and beat so as to loosen the texture. The dried leaves answer the same purpose. They are smoked by means of common tobacco-pipe. The smoke produces a sense of heat in the lungs followed by copious expectoration, and attended frequently with temporary vertigo or drowsiness, and sometimes with nausea. The remedy shoul never be used in plethoric cases, unless preceded by ample depletion. Dangerous and even fatal consequences are said to have resulted from its incautious or improper use. Stramonium has sometimes been given by the stomach in the same complaint.

Externally the medicine is used advantageously as an ointment or cataplasm in irritable ulcers, inflamed tumours, swelling of the mammæ, an painful hemorrhoidal affections. By American surgeons it is very frequently applied to the eye, in order to produce dilatation of the pupil, previously to the operation for cataract; and is found equally efficacious with belladonna. For this purpose the extract, mixed with lard, is generally rubbed over the eyelid, or a solution of it dropped into the eye.

Of the parts of the plant employed, the seeds are the most powerful. They may be given in the dose of a grain twice a day; and an extract made by evaporating the decoction, in one quarter or half of the quantity. The dose of the powdered leaves is two or three grains. The inspissated juice of the fresh leaves, which is the officinal extract, is more commonly prescribed than any other preparation, and may be administered in the quantity of one grain. (See *Extractum Stramonii.*) There is also an officinal tincture to which the reader is referred. Whatever preparation is used, the dose should be gradually increased till the narcotic operation becomes evident, or relief from the symptoms of the disease is obtained. The quantity of fifteen or twenty grains of the powdered leaves, and a proportionate amount of the other preparations, have often been given daily without unpleasant effects.

Off. Prep. Extractum Stramonii, *U.S., Dub.;* Tinctura Stramonii, *U.S.*

W.

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STYRAX. *U.S.*

Storax.

"Styrax officinale. Succus concretus. *The concrete juice.*" *U.S.*

Off. Syn. STYRACIS BALSAMUM. Styrax officinale. Balsamum. *Lond.;* STYRACIS OFFICINALIS BALSAMUM. *Ed.;* STYRAX OFFICINALE. Resina. *Dub.*

Storax, *Fr., Germ.;* Storace, *Ital.;* Estoraque, *Span.*

Styrax. See BENZOINUM.

Styrax officinale. Willd. *Sp. Plant.* ii. 623; Woodv. *Med. Bot.* p. 291. t. 101. This species of Styrax is a tree which rises from fifteen to twenty-five feet in height, sends off many branches, and is covered with a rough gray bark. The leaves are alternate, petiolate, entire, oval, pointed, of a bright-green on their upper surface, white with a cotton-like down upon the under, about two inches in length, and an inch and a half in breadth. The flowers are united in clusters of three or four at the extremities of the branches. They are white, and bear considerable resemblance to those of the orange.

This tree is a native of Syria and other parts of the Levant, and has become naturalized in Italy, Spain, and the South of France, where, however, it does not yield balsam. This circumstance has induced some naturalists to doubt whether the *Styrax officinale* is the real source of storax; and as the *Liquidambar styraciflua* of this country affords a balsam closely analogous to that under consideration, Bernard de Jussieu conjectured that the latter might be derived from another species of the same genus, the *L. orientale* of Lamarck, which is more abundant in Syria than *Styrax*.

Storax is obtained in Asiatic Turkey by making incisions into the trunk of the tree. Several kinds are mentioned in the books. The purest is the *storax in grains*, which is in whitish, yellowish-white, or reddish-yellow tears, about the size of a pea, opaque, soft, adhesive, and capable of uniting so as to form a mass. Another variety formerly called *storax calamita*, from the circumstance, as is supposed, that it was brought wrapped in the leaves of a kind of reed, consists of dry and brittle masses, formed of yellowish agglutinated tears, in the interstices of which is a brown or reddish matter. The French writers call it *storax amygdaloïde.* Both this and the preceding variety have a very pleasant odour like that of vanilla. Neither of them, however, is brought to our markets.

A third variety, which is sometimes sold as the *storax calamita,* is in brown or reddish-brown masses of various shapes, light, friable, yet possessing a certain degree of tenacity, and softening under the teeth. It evidently consists of saw-dust, united either with a portion of the balsam, or with other analogous substances. As found in the shops of this country, it is usually in the state of a coarse, soft, dark-coloured powder, mingled with occasional light friable lumps of various magnitude, and containing very little of the balsam. When good, it should yield upon pressure between two hot plates, a brown, resinous fluid, having the odour of storax.

Another variety found in our market, is a semi-fluid adhesive matter, called *liquid storax,* which is brown or almost black upon the surface exposed to the air, but of a light slightly greenish gray colour within, and of an odour somewhat like that of the Peruvian balsam. It is kept in jars, and is the kind most employed. What is the source of liquid storax is not certainly known. Some suppose it to be derived by decoction from the young branches of the *Liquidambar styraciflua;* but some of the genuine juice of this plant, brought from New Orleans, which we have had an opportunity of inspecting, has an odour entirely distinct from that of the substance under consideration.

General Properties. Storax has a fragrant odour and aromatic taste. It melts with a moderate heat, and when the temperature is raised takes fire and burns with a white flame, leaving a light spongy carbonaceous residue. It imparts its odour to water, which it renders yellow and milky. With the exception of impurities, it is wholly dissolved by alcohol and ether. Newmann obtained from 480 grains of storax 120 of watery extract; and from an equal quantity 360 grains of alcoholic extract. It yields benzoic acid by distillation, and is therefore entitled to the rank of a balsam. It contains also resin and volatile oil.

Medical Properties and Uses. This balsam is a stimulant expectorant, and was formerly recommended in phthisis, chronic catarrh, asthma, and amenorrhœa; but it is very seldom used at present, except as a constituent of the compound tincture of benzoin. The liquid storax has recently been recommended in gonorrhœa and leucorrhœa as equally effectual with copaiba, and less disagreeable. From ten to twenty grains may be given twice a day, and the dose gradually increased.

Off. Prep. Pilulæ e Styrace, *Dub.;* Styrax Purificata, *U.S.;* Tinctura Benzoini Composita, *U.S., Lond., Ed., Dub.* W.

◆

SUCCINUM. *U.S., Lond., Ed., Dub.*

Amber.

Succin, Ambre jaune, Karabé, *Fr.;* Bernstein, *Germ.;* Ambra, *Ital.;* Succino, *Span.*

Amber is a kind of fossil resin of vegetable origin, occurring generally in small detached masses, in alluvial deposites, in different parts of the world. It is found chiefly in Prussia, either on the seashore, where it is thrown up by the Baltic, or underneath the surface, in the alluvial formations along the coast. It occurs, also, in considerable quantities near Catania, in Sicily. It is most frequently associated with bituminous wood and lignite, and sometimes encloses twigs of vegetables, and insects. In the United States, it was found in Maryland, at Cape Sable, near Magothy river, by Dr. Troost. In this locality it is associated with iron pyrites and lignite. It has also been discovered in New Jersey. The amber consumed in this country, however, is brought from the ports of the Baltic.

Properties. Amber is a brittle solid, generally in small irregular masses, permanent in the air, having a homogeneous texture and vitreous fracture, and susceptible of a fine polish. Its colour is generally yellow, either light or deep; but occasionally it is reddish-brown, or even deep brown. It has no taste, and is inodorous unless when heated, when it exhales a peculiar, aromatic, not unpleasant smell. It is usually translucent, though occasionally transparent or opaque. Its sp. gr. is 1.078. Water and alcohol scarcely act on it. When heated in the open air, it softens, melts, swells, and at last inflames, leaving, after combustion, a small portion of ashes. Subjected to distillation in a retort furnished with a tubulated receiver, it yields, first, a sour yellow liquid; and afterwards a thin yellowish oil, with a yellow crystalline sublimate, which is deposited in the neck of the retort and the upper part of the receiver. In the mean time a considerable quantity of combustible gas is given off, which must be allowed to escape from the tubulure of the receiver. By continuing the heat the oil gradually deepens in colour, until, towards the end of the distillation, it becomes black and of the consistence of pitch. The oil obtained is called *oil of amber;* the crystalline sublimate is of an acid nature, and is denominated *succinic acid.* As thus obtained it is impure, being contaminated with the oil.

Resinous substances, particularly copal, are sometimes fraudulently mixed with amber. They may be detected by the difference in their colour and fracture, and by their not emitting the peculiar odour of amber when thrown upon hot iron.

Composition. According to Berzelius, amber consists of 1. a volatile oil of an agreeable odour in small quantity, 2. a yellow resin, intimately united with a volatile oil, very soluble in alcohol, ether, and the alkalies, easily fusible, and resembling ordinary resins; 3. another resin, also combined with volatile oil, soluble in ether and the alkalies, sparingly soluble in cold, but more soluble in boiling alcohol; 4. succinic acid; 5. a principle, insoluble in alcohol, ether, and the alkalies, having some analogy to the lac resin of John. It also contains a strongly odorous, bright yellow balsam, which hardens by time, but preserves in part its odour. The ultimate constituents of amber are hydrogen, carbon, and oxygen.

Pharmaceutical Uses, &c. Amber was held in high estimation by the ancients as a medicine; but at present it is only employed in pharmacy and the arts. In pharmacy it is used to prepare succinic acid and oil of amber. (See *Acidum Succinicum* and *Oleum Succini.*) In the arts, it is made into ornaments, and employed in preparing varnishes. When put to the latter use it requires to be first subjected to roasting, whereby it is rendered soluble in alcohol and the fat oils.

Off. Prep. Acidum Succinicum, *Ed., Dub.;* Oleum Succini, *U. S., Lond., Ed., Dub.*

B.

SULPHUR. *U.S.*

Sulphur.

"Sulphur sublimatum et lotum. *Sulphur sublimed and washed.*" *U.S.*

Off. Syn. SULPHUR. SULPHUR SUBLIMATUM. SULPHUR LOTUM. *Lond.;* SULPHUR SUBLIMATUM. SULPHUR SUBLIMATUM LOTUM. *Ed.;* SULPHUR SULIMATUM. SULPHUR LOTUM. *Dub.*

Brimstone; Soufre, *Fr.;* Schwefel, *Germ.;* Zolfo, *Ital.;* Azufre, *Span.*

The officinal names placed at the head of this article designate the several forms in which uncombined sulphur is used in pharmacy and medicine. The London College alone admits the common roll brimstone, which it designates by the officinal name of *sulphur*, while the three British Colleges agree in recognising both *sublimed sulphur* and *washed sulphur*. The latter only is admitted in the United States Pharmacopœia, being designated by the appellation, *sulphur*, a name injudiciously applied in this sense, as it had previously been used in another acceptation by the London College. After these explanations, it is perceived that the names adopted by the British Colleges, are not strictly synonymes of "Sulphur" in the sense of the United States Pharmacopœia; but the preparations designated by them are so analogous, as to render it expedient to notice them under the same head. We shall accordingly treat of sulphur first in a general way, and afterwards, under the several forms of *roll*, *sublimed*, and *washed sulphur*.

Natural States. Sulphur is very generally disseminated throughout the mineral kingdom, and is almost always present, in minute quantity, in animal and vegetable matter. Among vegetables, it is particularly abundant in the cruciform plants. It occurs in the earth, either native or in combination. When native it is found in masses, translucent or opaque, or in the powdery form, mixed with various earthy impurities. In combination, it is usually united with certain metals, such as iron, lead, mercury, antimony, copper, and zinc, forming compounds called sulphurets. Native sulphur is most abundant in volcanic countries. The most celebrated mines of it are found at Solfaterra in the kingdom of Naples, in Sicily, and in the Roman States. It occurs also, in small quantities, in different localities in the United States.

Extraction, &c. Sulphur is obtained either from sulphur earths, or from the native sulphurets of iron and copper, called iron and copper pyrites. The sulphur earths are placed in earthen pots, set in oblong furnaces of brick-work, and surmounted by a horizontal tube, which communicates with another pot with a hole in its bottom, underneath which a vessel is placed containing water. Fire being applied, the sulphur rises in vapour, leaving the impurities behind, and being condensed again, drops from the perforated pot into the water beneath. Sulphur, as thus obtained, is called *crude sulphur*, and contains about one-twelfth of its weight of earthy matter. For purification, it is generally melted in a cast iron vessel. When the fusion is complete, the impurities subside, and the purer sulphur is dipped out and poured into cylindrical wooden moulds, which give it the form of solid cylinders, called in commerce *roll sulphur*, or *cane brimstone*. The dregs of this process constitute a very impure kind of sulphur, known by the name of *sulphur vivum* in the shops.

The above process purifies the sulphur but imperfectly, and at the same time causes a considerable loss; as the dregs, just alluded to, contain a large proportion of sulphur. A more eligible mode of purification consists in distilling the crude sulphur in a large cast iron vessel, surmounted with a capital, built of masonry and communicating laterally with a chamber of brickwork, furnished with stop-cocks even with its floor, and with a valve in its roof to allow the escape of rarefied air. Besides the opening by which the capital communicates with the chamber, it has another, through which the iron vessel may be charged, and freed from the residue after each distillation. By this apparatus, the sulphur may be obtained either sublimed or in roll. If the distillation be rapidly performed, the chamber will become heated above the melting point of the sulphur, which, consequently, will condense in the liquid state, and may be drawn off by the cocks, and cast into sticks. If, however, the chamber be comparatively large, and the distillation be suspended during the night, its temperature will fall so low that the vapour of the sulphur will be condensed on its surface in the form of an extremely fine powder, known in commerce under the name of *sublimed sulphur*, or *flowers of sulphur.*

The extraction of sulphur from the sulphuret of iron is performed by distilling it in stone-ware cylinders. Half the sulphur contained in the sulphuret is volatilized by the heat, and conducted by means of an adopter into vessels containing water, where it condenses. The residue of the mineral is employed for the purpose of being converted into sulphate of iron, or green vitriol, by exposure to air and moisture. In the Island of Anglesea, large quantities of sulphur are obtained from copper pyrites in the process for extracting that metal. The furnaces in which the ore is roasted are connected by horizontal flues with chambers, in which the volatilized sulphur is condensed. Each chamber is furnished with a door, through which the sulphur is withdrawn once in six weeks.

According to Berzelius, a very economical method of extracting sulphur from iron pyrites is practised in Sweden, which saves the expenditure of fuel. The pyrites is introduced into furnaces with long horizontal chimneys, of which the part next to the furnace is of brick-work, while the rest is formed of wood. The pyrites is kindled below, and continues to burn of itself; and the heat generated causes the stratum immediately above the part kindled to give off half its sulphur, which becomes condensed in flowers in the wooden chimney. As the fire advances, the iron and the other half of the sulphur enter into combustion, and, by the increase of heat thus generated, cause the volatilization of a fresh portion of sulphur. In this manner, the process continues until the whole of the pyrites is consumed. The sulphur thus obtained is pulverulent and very impure, and requires, for purification, to be distilled in iron vessels.

Crude sulphur is employed by the manufacturers of sulphuric acid, and as it is very variable in quality, it becomes important to ascertain its exact value. This may be done by drying a given weight of it, and submitting it to combustion. The weight of the incombustible residue, added to that lost by desiccation, gives the amount of impurity.

Crude sulphur comes to this country principally from Trieste, Messina in Sicily, and the ports of Italy, being imported for the use of the sulphuric acid manufacturers. Roll sulphur and the flowers are usually brought from Marseilles.

Properties. Sulphur is an elementary non-metallic brittle solid, of a pale yellow colour, permanent in the air, and exhibiting a crystalline texture and shining fracture. It has a slight taste, and a perceptible smell when rubbed. When pure, its sp. gr. is about 2; but occasionally, from impurity, it is as high as 2.35. Its equiv. number is 16.1. It is a bad conductor of heat, and becomes negatively electric by friction. It is insoluble in water, but soluble in alkaline solutions, petroleum, fat oils, and, provided it be in a finely divided state, in alcohol and ether. Upon being heated, it begins to volatilize at about 180°, when its peculiar odour is perceived; it melts at 225°, and at 600°, in close vessels, boils, and rises in the form of a yellow vapour, which may be condensed again either in the liquid or pulverulent state, according as the temperature of the recipient is above or below the melting point of the sulphur. If the heating be conducted in open vessels, sulphur takes fire at about the temperature of 300°, and burns with a blue flame, combining with the oxygen of the air, and giving rise to a peculiar gaseous acid called sulphurous acid. As a chemical element, it is exceedingly important, its combinations being numerous, and among the most powerful agents of chemistry. With oxygen, it forms four acids, the *hyposulphurous*, *sulphurous*, *hyposulphuric*, and *sulphuric*, with hydrogen, *hydrosulphuric acid* or *sulphuretted hydrogen*, and with the metals, various *sulphurets*. Many of its combinations are analogous to acids and bases, and are susceptible of combining with each other, forming compounds analogous to salts, and hence called by Berzelius *sulpho-salts*.

The minerals which are roasted to obtain sulphur sometimes contain arsenic; and hence sulphur is occasionally contaminated with this metal, and thereby rendered poisonous. The common English roll sulphur is said often to contain as much as a fifteenth of orpiment; but the accuracy of this statement may be deemed very doubtful.

The above description applies to sulphur generally; but in its several pharmaceutical states, of roll, sublimed, and washed sulphur, it presents modifications which require to be noticed.

Roll sulphur is in cylindrical sticks about an inch in diameter, and of various lengths. Though one of the purest forms of sulphur, it still contains about four parts in a thousand of hydrogen. The way in which it is obtained has already been described.

Sublimed sulphur, usually called *flowers of sulphur*, is in the form of a crystalline powder of a fine yellow colour. It is always contaminated with a little sulphuric acid which is formed, during its sublimation, at the expense of the oxygen of the air, contained in the subliming chambers. It is on this account that sublimed sulphur always reddens litmus; and if the acid be present in considerable quantity, it sometimes cakes. It may be freed from all acidity by ablution with hot water, when it becomes washed sulphur.

Washed sulphur is the only form of sulphur officinal in the United States Pharmacopœia, in which it is designated by the simple name, *Sulphur*. It was considered by the framers of that work to be the best medicinal form of this substance; and, therefore, the only one which should be used for internal exhibition. It is placed in the list of the Materia Medica in our national work, but the British Colleges give directions for preparing it. The process of the Dublin College, which appears to be the most eligible, is to pour warm water on sublimed sulphur, and to continue the washing as long as the water, when poured off, continues to be impregnated with acid, which may be known by the test of litmus. The sulphur is then dried on bibulous paper. The directions of the London and Edinburgh Colleges do not materially differ from those of the Dublin. Washed sulphur has the general appearance of sublimed sulphur; but if properly prepared it does not affect litmus, and undergoes no change by exposure to the atmosphere.

Medical Properties and Uses. Sulphur is laxative and diaphoretic. It evidently passes off by the pores of the skin; as is shown by the fact, that silver worn in the pockets of patients under a course of it, becomes blackened with a coating of sulphuret. As a laxative it is gentle in its operation, unless it contain a good deal of acid, when it causes griping; and the liability of the sublimed sulphur to contain acid, renders it less eligible for exhibition than the washed sulphur, from which all acidity is removed. The diseases in which sulphur is principally used, are hemorrhoidal affections, chronic rheumatism and catarrh, atonic gout, asthma, and other affections of the respiratory organs unattended with acute inflammation. It is also much employed, both internally and externally, in cutaneous affections, especially in scabies, for the cure of which it is considered a specific. The dose is from one to three drachms, mixed with syrup or molasses, or taken in milk. It is very often combined with supertartrate of potassa, or magnesia.

Sulphur is consumed in the arts, principally in the manufacture of gunpowder and sulphuric acid.

Off. Prep. Ferri Sulphuretum, *U.S., Ed., Dub.;* Hydrargyri Sulphuretum Nigrum, *U.S., Lond., Ed., Dub.;* Hydrargyri Sulphuretum Rubrum, *U.S., Lond., Dub.;* Oleum Sulphuratum, *Lond., Ed.;* Potassæ Sulphuretum, *U.S., Lond., Ed., Dub.;* Sodæ Sulphuretum, *U.S.;* Sulphur Præcipitatum, *U.S., Lond.;* Unguentum Sulphuris, *U.S., Lond., Ed., Dub.;* Unguentum Sulphuris Compositum, *U. S., Lond.* B.

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TABACUM. *U.S.*

Tobacco.

"Nicotiana tabacum. Folia. *The leaves.*" *U.S.*

Off. Syn. TABACI FOLIA. Nicotiana Tabacum. Folia exsiccata. *Lond.;* NICOTIANÆ TABACI FOLIA. *Ed.;* NICOTIANA TABACUM. Folia. *Dub.*

Tabac, *Fr.;* Tabak, *Germ.;* Tobacco, *Ital.;* Tabaco, *Span.*

Nicotiana. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Solaneæ.

Gen. Ch. Corolla funnel-shaped, with the border plaited. *Stamens* inclined. *Capsules* two-valved, two-celled. *Willd.*

Nicotiana Tabacum. Willd. *Sp. Plant.* i. 1014; Bigelow, *Am. Med. Bot.* ii. 171; Woodv. *Med. Bot.* p. 208. t. 77. The tobacco is an annual plant, with a large fibrous root, and an erect, round, hairy, viscid stem, which branches near the top, and rises from three to six feet in height. The leaves are numerous, alternate, sessile and somewhat decurrent, very large, ovate lanceolate, pointed, entire, slightly viscid, and of a pale green colour. The lowest are often two feet long, and four inches broad. The flowers are disposed in loose terminal panicles, and are furnished with long, linear, pointed bractes at the divisions of the peduncle. The calyx is bell-shaped, hairy, somewhat viscid, and divided at its summit into five pointed segments. The tube of the corolla is twice as long as the calyx, of a greenish hue, swelling at top into an oblong cup, and ultimately expanding into a five-lobed, plaited, rose-coloured border. The whole corolla is very viscid. The filaments incline to one side, and support oblong anthers. The pistil consists of an oval germ, a slender style longer than the stamens, and a cleft stigma. The fruit is an ovate, two-valved, two-celled capsule, containing numerous reniform seeds, and opening at the summit.

Although the original locality of this plant is not settled to the satisfaction of all botanists, there is good reason to believe that it is a native of tropical America, where it was found by the Spaniards upon their arrival. It is at present cultivated in most parts of the world, and nowhere more abundantly than within the limits of the United States. We seldom, however, see it north of Maryland. Virginia is, perhaps, the region of the world most celebrated for its culture. The young shoots, produced from seeds thickly sown in beds, are transplanted into the fields during the month of May, and set in rows with an interval of three or four feet between the plants. Through the whole period of its growth, the crop requires constant attention. The development of the leaves is promoted by removing the top of each plant, and thus preventing it from running into flower and seed. The harvest is in August. The ripe plants having been cut off above their roots, are dried under cover, and then stripped of their leaves, which are tied in bundles, and packed in hogsheads.

Two varieties of this species are mentioned by authors, one with narrow, the other with broad leaves; but they do not differ materially in properties. Great diversity in the quality of tobacco is produced by difference of soil and mode of cultivation; and several varieties are recognised in commerce. Other species of Nicotiana are also cultivated, especially the *N. rustica* and *N. paniculata*, the former of which is said to have been the first introduced into Europe, and is thought to have been cultivated by the aborigines of this country, as it is naturalized near the borders of some of our small northern lakes. The *N. quadrivalvis* of Pursh affords tobacco to the Indians of the Missouri and Columbia rivers; and the *N. fruticosa*, a native of China, was probably cultivated in Asia before the discovery of this continent by Columbus.

Properties. Tobacco, as it occurs in commerce, is of a yellowish-brown colour, a strong narcotic penetrating odour which is less obvious in the fresh leaves, and a bitter nauseous and acrid taste. These properties are imparted to water and alcohol. They are destroyed by long boiling; and the extract is therefore feeble or inert. An elaborate analysis of tobacco was made by Vauquelin, who discovered in it, among other ingredients, an acrid, volatile, colourless principle, slightly soluble in water, very soluble in alcohol, and supposed at one time to be the active principle of the leaves. It was separated by a very complicated process, and received the name of *nicotin*, which, however, has been subsequently applied to a different principle. An analogous substance was procured by Hermstadt, by simply distilling water from tobacco, and allowing the liquor to stand for several days. A white crystalline matter rose to the surface, which, upon being removed, was found to have the odour of tobacco, and its influence on the system. In solubility it agreed with the nicotin of Vauquelin, and like it was neither alkaline nor acid. Acetate of lead and nitrate of mercury precipitated it from its aqueous solution, infusion of galls from its solution in alcohol. It melted at a moderate heat, and was slowly volatilized. In the dose of a grain it produced nausea, retching, and vertigo; and excited sneezing when applied in minute quantity to the nostrils. It was called *nicotianin* by Hermstadt, and appears to partake of the nature of the volatile oils. More recently, two German chemists, Posselt and Reimann, have analyzed tobacco, and obtained some interesting results. According to these chemists, 10,000 parts of the fresh leaves contain 6 parts of an alkaline principle, which they call *nicotin*, 1 of the *nicotianin* of Hermstadt, 287 of slightly bitter extractive, 174 of gum mixed with a little malate of lime, 26.7 of green resin, 26 of albumen, 104.8 of a substance analogous to gluten, 51 of malic acid, 12 of malate of ammonia, 4.8 of sulphate of potassa, 6.3 of chloride of potassium, 9.5 of potassa, which was combined in the leaves with malic and nitric acids, 16.6 of phosphate of lime, 24.2 of lime which had been combined with malic acid, 8.8 of silica, 496.9 of lignin, traces of starch, and 8828 parts of water. (*Berzelius, Trait. de Chim.*)

Nicotin, or, as it should be called, *nicotia*, when perfectly pure, is liquid, transparent, colourless, of an odour somewhat like that of tobacco, but acrid, pungent, and disagreeable, and of an acrid, burning, durable taste. At 212° it diffuses white vapours in the air, but requires a much higher temperature for ebullition. Upon exposure it becomes brown and thicker, and is partially decomposed. It is inflammable, but does not burn readily unless with the aid of a wick. It is soluble in water in all proportious, and is readily soluble in ether. It restores the blue colour of litmus paper reddened by acids, and colours turmeric paper brown. It is consequently alkaline. On the animal economy it acts as a violent poison. A single drop is sufficient to destroy a dog. The salts of nicotin have a burning and acrid taste, with the flavour of tobacco. They are colourless, and for the most part soluble in alcohol and water, but insoluble in ether. To obtain nicotin, dried tobacco leaves are boiled in water acidulated with sulphuric acid, the decoction is evaporated by a gentle heat, and the residue treated with alcohol of the sp. gr. 0.848. The alcoholic solution of sulphate of nicotin thus obtained, is concentrated by distillation, then mixed with hydrate of magnesia or lime, and again distilled. The product of the distillation is a solution of nicotin and ammonia. This is agitated with ether, to which it yields a part of the nicotin. The solution separated from the ether is added to the residue contained in the root, and again distilled. The product yields to ether a fresh portion of nicotin; and the operation is repeated till the residue in the retort loses its acrimony, retaining only a bitter taste. The ethereal solution is deprived of water by the chloride of calcium, and then distilled. The ether first passes over, and afterwards the nicotin, when the temperature of the retort exceeds 212°. Thus obtained, nicotin has the consistence of honey, and a brown colour. To obtain it quite pure it should be redistilled by means of an oil bath, at the temperature of about 284°. It may be obtained by other processes. It exists in tobacco in very small proportion, constituting only one part in one thousand of the dry leaves. Buchner found it also in the seeds.

Nicotianin is the odorous principle of tobacco. Posselt and Reimann prepared it by distilling six pounds of the fresh leaves with twelve pounds of water, till one half of the liquid passed over, then adding six pounds more of water, and again distilling, and repeating this process three times. The nicotianin was obtained to the amount of eleven grains, floating on the surface of the water. It was a fatty substance, having the smell of tobacco-smoke, and an aromatic somewhat bitter taste. It was volatilizable by heat, insoluble in water, soluble in alcohol and ether, and not affected by the dilute acids, but dissolved by the solution of potassa.

When distilled at a temperature above that of boiling water, tobacco affords an empyreumatic oil, which Mr. Brodie has proved to be a most virulent poison, and which probably holds the volatile acrid principle of this narcotic in solution. A single drop of the oil injected into the rectum of a cat occasioned death in about five minutes, and double the quantity administered in the same manner to a dog was followed by the same result. This oil is of a dark brown colour, of an acrid taste, and has a very peculiar smell, exactly resembling that of tobacco pipes, which have been much used.

Medical Properties and Uses. Tobacco unites with the powers of a sedative narcotic, those of an emetic and diuretic; and produces these effects to a greater or less extent to whatever surface it may be applied. In addition, when snuffed up the nostrils, it excites violent sneezing and a copious secretion of mucus; when chewed, it irritates the mucous membrane of the mouth, and increases the flow of saliva; and when injected into the rectum, it operates as a cathartic. Very moderately taken, it quiets restlessness, calms mental and corporeal inquietude, and produces a state of general languor or repose, which has great charms for those habituated to the impression. In larger quantities, it gives rise to confusion of the head, vertigo, stupor, faintness, nausea, vomiting, and general debility of the nervous and circulatory functions, which, if increased, eventuates in alarming and even fatal prostration. The symptoms of its excessive action are severe retching, with the most distressing and continued nausea, great feebleness of pulse, coldness of the skin, fainting, and sometimes convulsions. It probably operates both through the medium of the nervous system, and by entering the circulation. As its local action is stimulant, we can thus account for the fact, that it excites the function of the kidneys, at the same time that it reduces the nervous and secondarily the arterial power. The experiments of Brodie lead to the inference that the function of the heart is affected by tobacco, through the medium of the nervous system; for in a decapitated animal in which the circulation was sustained by artificial respiration, the infusion injected into the rectum did not diminish the action of the heart; while on the contrary this organ almost immediately ceased to contract when an equal dose of the poison was administered to a healthy animal. Mr. Brodie observed a remarkable difference between the operation of the infusion and that of the empyreumatic oil. After death from the former the heart was found completely quiescent, while it continued to act with regularity for a considerable time after apparent death from the latter. We may infer from this fact, either that there are two poisonous principles in tobacco, or that a new narcotic product is formed during its destructive distillation.

The use of tobacco was adopted by the Spaniards from the American Indians. In the year 1560 it was introduced into France, by the ambassador of that country at the court of Lisbon, whose name—Nicot—has been perpetuated in the generic title of the plant. Sir Walter Raleigh is said to have introduced the practice of smoking into England. In the various modes of smoking, chewing, and snuffing, the drug is now extensively consumed in every country on the globe. It must have properties peculiarly adapted to the propensities of our nature, to have thus surmounted the first repugnance to its odour and taste, and to have become the passion of so many millions. When employed in excess it enfeebles the digestive powers, produces emaciation and general debility, and lays the foundation of serious disorders of the nervous system.

Its remedial employment is less extensive than would naturally be inferred from the variety of its powers. The excessive and distressing nausea which it is apt to occasion, interferes with its internal use; and it is very seldom administered by the stomach. As a narcotic it is employed chiefly to produce relaxation in spasmodic affections. For this purpose, the infusion or smoke of tobacco, or the leaf in substance in the shape of a suppository, is introduced into the rectum in cases of strangulated hernia, obstinate constipation from spasm of the bowels, and retention of urine from a spasmodic stricture of the urethra. For a similar purpose, the powdered tobacco, or common snuff, mixed with simple cerate, as recommended by the late Dr. Godman, is sometimes applied to the throat and breast in cases of croup; and Dr. Chapman has directed the smoking of a cigar in the same complaint, with decided benefit. One of the worst cases of spasm of the rima glottidis which we have seen, and which resisted powerful depletion by the lancet, yielded to the application of a tobacco cataplasm to the throat. A similar application to the abdomen is highly recommended in painters' colic. Tetanus is said to have been cured by baths made with the decoction of the fresh leaves. The relaxation produced by smoking, in a person unaccustomed to it, has been very happily resorted to by Dr. Physick, in a case of obstinate and long continued dislocation of the jaw; and the same remedy has frequently been found useful in the paroxysm of spasmodic asthma. As an emetic, tobacco is seldom or never employed, unless in the shape of a cataplasm to the epigastrium, to assist the action of internal medicines, in cases of great insensibility of stomach. As a diuretic it was used by Fowler in dropsy and dysury, but the practice is not often imitated. There is no better errhine than tobacco, for the ordinary purposes for which this class of medicines is employed. As a sialagogue, it is beneficial in rheumatism of the jaws, and often relieves toothach by its anodyne action. It is also used externally in the shape of cataplasm, infusion, or ointment, in cases of tinea capitis, psora, and some other cutaneous affections. The empyreumatic oil mixed with simple ointment, in the proportion of twenty drops to the ounce, has been applied with advantage, by American practitioners, to indolent tumours and ulcers; but in consequence of its liability to be absorbed, and to produce unpleasant effects on the system, it should be used with great caution. This remark is applicable to all the modes of employing tobacco; particularly to the injection of the infusion into the rectum, which has in more than one instance caused the death of the patient. It is even more dangerous than a proportionate quantity introduced into the stomach, as, in the latter case, the poison is more apt to be rejected.

Five or six grains of powdered tobacco will generally act as an emetic; but the remedy is not given in this shape. The infusion used in dropsy by Fowler, was made in the proportion of an ounce to a pint of boiling water, and given in the dose of sixty or eighty drops. The officinal infusion, which is employed for injection, is much weaker. (See *Infusum Tabaci.*) A wine and an ointment of tobacco are directed by the United States Pharmacopœia.

Off. Prep. Infusum Tabaci, *U. S.*, *Lond.*, *Dub.;* Vinum Tabaci, *U. S.*, *Ed.;* Unguentum Tabaci, *U. S.* W.

TAMARINDUS. *U. S.*

Tamarinds.

"Tamarindus Indica. Fructus conditus. *The preserved fruit.*" *U. S.*

Off. Syn. TAMARINDI PULPA. Tamarindus Indicus. Leguminis pulpa. *Lond.;* TAMARINDI INDICÆ FRUCTUS. *Ed.;* TAMARINDUS INDICUS. Leguminis pulpa. *Dub.*

Tamarins, *Fr.;* Tamarinden, *Germ.;* Tamarindi, *Ital.;* Tamarindos, *Span.*

Tamarindus. *Sex. Syst.* Monadelphia Triandria.—*Nat. Ord.* Leguminosæ.

Gen. Ch. *Calyx* four-parted. *Petals* three. *Nectary* with two short bristles under the filaments. *Legume* filled with pulp. *Willd.*

Tamarindus Indica. Willd. *Sp. Plant.* iii. 577; Woodv. *Med. Bot.* p. 448. t. 161. The tamarind tree is the only species of this genus. It rises to a great height, sends off numerous spreading branches, and has a beautiful appearance. The trunk is erect, thick, and covered with a rough, ash-coloured bark. The leaves are alternate and pinnate, composed of many pairs of opposite leaflets, which are almost sessile, entire, oblong, obtuse, unequal at their base, about half an inch long, a sixth of an inch broad, and of a yellowish-green colour. The flowers, which are in small lateral racemes, have a yellowish calyx, and petals which are also yellow, but beautifully variegated with red veins. The fruit is a broad, compressed, reddish ash-coloured pod, very much curved, from two to six inches long, and with numerous brown, flat, quadrangular seeds, contained in cells formed by a tough membrane. Exterior to this membrane is a light-coloured acid pulpy matter, between which and the shell are several tough ligneous strings, running from the stem to the extremity of the pod, the attachment of which they serve to strengthen. The shells are very fragile, and easily separated.

The Tamarindus Indica appears to be a native of the East and West Indies, of Egypt, and Arabia, though believed by some authors to have been imported into America. De Candolle is doubtful whether the East and West India trees are of the same species. The pods of the former are much larger than those of the latter, and contain a greater number of seeds. At least such is the statement made by authors, who inform us that East India tamarinds contain six or seven seeds, those from the West Indies rarely more than three or four. We have found, however, in a parcel of the latter which we have examined, numerous pods with from eight to ten seeds, and the number generally exceeded four. The fruit is the officinal portion.

Tamarinds are brought to us chiefly, if not exclusively, from the West Indies, where they are prepared by placing the pods, previously deprived of their shell, in layers in a cask, and pouring boiling syrup over them. A better mode, sometimes practised, is to place them in stone jars, with alternate layers of powdered sugar. They are said to be occasionally prepared in copper boilers.

Properties. Fresh tamarinds, which are sometimes, though rarely, brought to this country, have an agreeable sour taste, without any mixture of sweetness. As we usually find them, in the preserved state, they form a dark-coloured adhesive mass, consisting of syrup mixed with the pulp, membrane, strings, and seeds of the pod, of a sweet acidulous taste. The seeds should be hard, clean, and not swollen, the strings tough and entire, and the smell without mustiness. From the analysis of Vauquelin it appears, that in 100 parts of the pulp of tamarinds, independently of the sugar added to them, there are 9.40 parts of citric acid, 1.55 of tartaric acid, 0.45 of malic acid, 3.25 of supertartrate of potassa, 4.70 of gum, 6.25 of jelly, 34.35 of parenchymatous matter, and 27.55 of water; so that the acidity is chiefly owing to the presence of citric acid. It is said that copper may sometimes be detected in preserved tamarinds, derived from the boilers in which they are occasionally prepared. Its presence may be ascertained by the reddish coat which it imparts to the blade of a knife immersed in the tamarinds.

Medical Properties and Uses. Tamarinds are laxative and refrigerant, and infused in water form a highly grateful drink in febrile diseases. Convalescents often find the pulp a pleasant addition to their diet, and useful by preserving the bowels in a loose condition. It is sometimes prescribed in connexion with other mild cathartics, and is one of the ingredients of the confection of senna. Though frequently prescribed with the infusion of senna to cover the taste of that medicine, it is said to weaken its purgative power; and the same observation has been made of its influence upon the resinous cathartics in general. From a drachm to an ounce or more may be taken at a dose.

Off. Prep. Confectio Cassiæ, *Lond.*, *Ed.*, *Dub.*; Confectio Sennæ, *U.S.*, *Lond.*, *Ed.*, *Dub.*; Infusum Sennæ cum Tamarindis, *Dub.*, *Ed.* W.

TANACETUM. *U.S. Secondary.*

Tansy.

"Tanacetum vulgare. Herba. *The herb.*" *U. S.*

Off. Syn. TANACETI VULGARIS FLORES, FOLIA. *Ed.;* TANACETUM VULGARE. Folia. *Dub.*

Tanaisie, *Fr.;* Gemeiner Rheinfarrn, Wurmkraut, *Germ.;* Tanaceto, *Ital., Span.*

TANACETUM. *Sex. Syst.* Syngenesia Superflua.—*Nat. Ord.* Compositæ Corymbiferæ.

Gen. Ch. Receptacle naked. *Pappus* somewhat marginate. *Calyx* imbricate, hemispherical. *Corolla* rays obsolete, trifid. *Willd.*

Tanacetum vulgare. Willd. *Sp. Plant.* iii. 1814; Woodv. *Med. Bot.* p. 66. t. 27. This is a perennial herbaceous plant, rising two or three feet in height. The stems are strong, erect, obscurely hexagonal, striated, often reddish, branched towards the summit, and furnished with alternate, doubly pinnatifid leaves, the divisions of which are notched or deeply serrate. The flowers are yellow, and in dense terminal corymbs. Each flower is composed of numerous florets, of which those constituting the disk are perfect and five-cleft, those of the ray very few, pistillate, and trifid. The calyx consists of small, imbricated, lanceolate leaflets, having a dry scaly margin. The seeds are small, oblong, with five or six ribs, and crowned by a membranous pappus.

Tansy is cultivated in our gardens, and grows wild in the roads and old fields; but was introduced from Europe, where it is indigenous. It is in flower from July to September. The leaves are ordered by the Edinburgh and Dublin Colleges; but the flowers and seeds are not less effectual, and all are included in the directions of the United States Pharmacopœia.

There is a variety of the plant with curled leaves, which is said to be more grateful to the stomach than that above described, but has less of the peculiar sensible properties of the herb, and is probably less active as a medicine.

The odour of tansy is strong, peculiar, and fragrant, but much diminished by drying; the taste is warm, bitter, somewhat acrid, and aromatic. These properties are imparted to water and alcohol. The medical virtues of the plant depend on a bitter extractive and a volatile oil. The latter, when separated by distillation, has a greenish-yellow colour, and deposites camphor upon standing. The seeds contain the largest proportion of the bitter principle, and the least of volatile oil.

Medical Properties and Uses. Tansy has the medical properties common to the aromatic bitters; and has been recommended in intermittents, hysteria, amenorrhœa, and as a preventive of the arthritic paroxysms; but at present it is chiefly used as an anthelmintic, and in this country is scarcely employed, for any purpose, in regular practice. The seeds are said to be most effectual as a vermifuge. The dose of the powder is from thirty grains to a drachm two or three times a day; but the infusion is more frequently administered. A fatal case of poisoning with half an ounce of oil of tansy is recorded in the Medical Magazine for November, 1834. Frequent and violent clonic spasms were experienced, with much disturbance of respiration; and the action of the heart gradually became weaker till death took place from its entire suspension. No inflammation of the stomach or bowels was discovered upon dissection. (*Am. Journ. of the Med. Sci.* xvi. 256.)

W.

TAPIOCA. *U.S.*

Tapioca.

"Jatropha manihot. Radicis fæcula. *The fecula of the root.*" *U.S.*

Jatropha. *Sex. Syst.* Monœcia Monadelphia.—*Nat. Ord.* Euphorbiaceæ.

Gen. Ch. Male. *Calyx* none, or five-leaved. *Corolla* monopetalous, funnel-shaped. *Stamens* ten, alternately shorter. Female. *Calyx* none. *Corolla* five-petaled, spreading. *Styles* three, bifid. *Capsule* three-celled. *Seed* one. *Willd.*

Most if not all of the species of Jatropha are impregnated, like other plants of the natural family of Euphorbiaceæ, with an acrid, purging, poisonous principle. The seeds of the *J. Curcas*, which are known in Europe by the name of *purging nuts*, or *Barbadoes nuts*, have properties closely similar to those of the *Croton Tiglium* and *Ricinus communis*. They are blackish, oval, about eight lines long, flat on one side, convex on the other; and the two sides present a slight longitudinal prominence. Four or five of these seeds slightly roasted, and deprived of their envelope, are sufficient to purge actively; and in a large dose they are capable of producing fatal consequences. Their active principle is said to reside exclusively in the embryo. Upon pressure they yield an oil which has all the properties of the croton oil. We are not aware that they are employed in this country. The only species of Jatropha acknowledged as officinal in our Pharmacopœia is the *J. Manihot*, which yields the *tapioca* of the shops.

Jatropha Manihot. Willd. *Sp. Plant.* iv. 562. This is the *cassava* plant of the West Indies, the *mandioca* or *tapioca* of Brazil. It is a shrub about six or eight feet in height, with a very large, white, fleshy, tuberous root, which often weighs thirty pounds. The stem is round, jointed, and furnished at its upper part with alternate petiolate leaves, deeply divided into three, five, or seven oval lanceolate, very acute lobes, which are somewhat wavy upon their borders, of a deep green colour on their upper surface, glaucous and whitish beneath. The flowers are in axillary racemes.

The Jatropha Manihot is a native of South America, and is cultivated extensively in the West Indies, Brazil, and other parts of Tropical America, for the sake of its root, which is much employed as an article of food. The plant is of quick growth, and the root arrives at perfection in about eight months. There are two varieties, distinguished by the names of *sweet* and *acrid*. The root of the former may be eaten with impunity; that of the latter, which is most extensively cultivated, abounds in an acrid milky juice, which renders it highly poisonous if eaten in the recent state. Both contain a large proportion of starch. The root is prepared for use by washing, scraping, and grating or grinding it into a pulp, which, in the case of the acrid variety, is submitted to pressure so as to separate the deleterious juice. It is now in the state of meal or powder, which is made into bread, cakes, or puddings. As the acrid principle is volatile, the portion which may have remained in the meal is entirely dissipated by the heat employed in cooking. The preparation denominated tapioca among us is obtained from the expressed juice. This, upon standing, deposites a powder, which, after repeated washings with cold water, is nearly pure fecula. It is dried by exposure to heat, which renders it partly soluble in cold water, and enables it to assume the consistence by which it is characterized. When dried without heat, it is pulverulent, and closely resembles the fecula of arrow-root.

Tapioca is in the form of irregular, hard, white, rough grains, possessing little taste, partially soluble in cold water, and affording a fine blue colour when iodine is added to its filtered solution. Being nutritious, and at the same time easy of digestion, and destitute of all irritating properties, it forms an excellent diet for the sick and convalescent. It is prepared for use by boiling it in water. Lemon juice and sugar will usually be found grateful additions; and in low states of disease or cases of debility, it may be advantageously impregnated with wine and nutmeg or other aromatic.

A factitious tapioca is found in the shops, consisting of very small, smooth, spherical grains, and supposed to be prepared from potato starch. It is sold under the name of *pearl tapioca.* W.

TARAXACUM. *U.S.*

Dandelion.

"Leontodon taraxacum. Radix. *The root.*" *U.S.*

Off. Syn. TARAXACI RADIX. Leontodon Taraxacum. Radix. *Lond.;* LEONTODI TARAXACI HERBA et RADIX. *Ed.;* LEONTODON TARAXACUM. Herba. Radix. *Dub.*

Pissenlit, Dent de lion, *Fr.;* Löwenzahn, *Germ.;* Tarassaco, *Ital.;* Diente de leon, *Span.*

Leontodon. *Sex. Syst.* Syngenesia Æqualis.—*Nat. Ord.* Compositæ Cichoraceæ.

Gen. Ch. Receptacle naked. *Calyx* double. *Seed-down* stipitate, hairy. *Willd.*

Leontodon Taraxacum. Willd. *Sp. Plant.* iii. 1544; Woodv. *Med. Bot.* p. 39. t. 16. The dandelion is an herbaceous plant, with a perennial, fusiform root. The leaves, which spring immediately from the root, are long, pinnatifid, generally runcinate, with the divisions toothed, smooth, and of a fine green colour. The common name of the plant was derived from the fancied resemblance of its leaves to the teeth of a lion. The flower-stem rises from the midst of the leaves, six inches or more in height. It is erect, simple, naked, smooth, hollow, fragile, and terminated by a large golden-coloured flower, which closes in the evening, and expands with the returning light of the sun. The calyx is smooth and double, with the outer scales bent downwards. The florets are very numerous, ligulate, and toothed at their extremities. The receptacle is convex and punctured. The seed-down is stipitate, and at the period of maturity, is disposed in a spherical form, and is so light and feathery as to be easily borne away by the wind, with the seeds attached.

This species of Leontodon grows spontaneously in most parts of the globe. It is abundant in this country, adorning our grass-plats and pasture grounds with its bright yellow flowers, which, in moist places, show themselves with the first opening of spring, and continue to appear till near the close of summer. All parts of the plant contain a milky bitterish juice, which exudes when they are broken or wounded. The leaves, when very young, and blanched by the absence of light during their growth, are tender and not unpleasant to the taste, and on the continent of Europe are sometimes used as a salad. When older and of their natural colour, they are medicinal, and have been adopted as officinal by the Edinburgh and Dublin Colleges. The United States and London Pharmacopœias recognise only the root, which is by far the most efficacious part of the plant. It should be full grown when collected, and should be employed in the recent state, as it is then most active. It does not, however, as stated by Duncan, lose nearly all its bitterness by drying; and the root dug up in the warmer seasons might, if dried with care, be employed with propriety in the succeeding winter.

The fresh full-grown root of the dandelion is several inches in length, about as thick as the little finger, round and tapering, somewhat branched, of a light brown colour externally, whitish within, having a yellowish ligneous cord running through its centre, and abounding in a milky juice. In the dried state it is much shrunk, wrinkled longitudinally, brittle, and when broken presents a shining somewhat resinous fracture. It is without smell, but has a sweetish, mucilaginous, bitterish, herbaceous taste. Its active properties are yielded to water by boiling, and do not appear to be injured in the process. The milky juice, examined by John, was found to contain bitter extractive, gum, caoutchouc, saline matters, a trace of resin, and a free acid. Besides these ingredients, starch and saccharine matter exist in the root.

Medical Properties and Uses. Taraxacum is slightly tonic, diuretic, and aperient; and is thought to have a specific action upon the liver, exciting it when languid to secretion, and resolving its chronic engorgements. It has been much employed in Germany, and is a very popular remedy with many practitioners in this country. The diseases to which it appears to be especially applicable, are those connected with the derangement of the hepatic system, and of the digestive organs generally. In congestion and chronic inflammation of the liver and spleen, in cases of suspended or deficient biliary secretion, and in dropsical affections dependent on obstruction of the abdominal viscera, it is capable of doing much good, if applied with a due regard to the degree of excitement. Our own experience is decidedly in its favour. An irritable condition of the stomach and bowels, and the existence of acute inflammation, contra-indicate its employment.

It is usually given in the form of extract or decoction. (See *Extractum Taraxaci.*) Two ounces of the fresh root, or an ounce of the dried, previously bruised or sliced, may be boiled with a pint of water down to half a pint, and two fluidounces of the preparation given twice or three times a day. Supertartrate of potassa is sometimes added when an aperient effect is desired; and aromatics will occasionally be found useful in correcting a tendency to griping or flatulence.

Off. Prep. Decoctum Taraxaci; *Dub.;* Extractum Taraxaci, *U.S.*, *Lond.*, *Dub.*

W.

TEREBINTHINA. *U.S.*

Turpentine.

"Pinus palustris, et aliæ. Succus. *The juice.*" *U.S.*

TEREBINTHINA CANADENSIS. *U.S., Lond.*

Canada Balsam.

"Pinus balsamea. Succus. *The juice.*" *U.S.*

Off. Syn. PINI BALSAMEÆ RESINA. Resina liquida. *Ed.;* BALSAMUM CANADENSE. PINUS BALSAMEA. Resina liquida. *Dub.*

TEREBINTHINA CHIA. *Lond., Dub.*

Chian Turpentine.

"Pistacia Terebinthus. *Resina liquida.*" *Lond.*

TEREBINTHINA VENETA. *Dub.*

Venice Turpentine.

"Pinus Larix. *Resina liquida.*" *Dub.*

Off. Syn. PINI RESINA LIQUIDA, *vulgo* TEREBINTHINA VENETA. Ex variis Pinis. *Ed.*

TEREBINTHINA VULGARIS. *Lond.*

Common Turpentine.

"Pinus sylvestris. *Resina liquida.*" *Lond.*

Off. Syn. PINI RESINA LIQUIDA, *vulgo* TEREBINTHINA VULGARIS. Ex variis Pinis. *Ed.;* PINUS SYLVESTRIS. Terebinthina Vulgaris. *Dub.*

Térébenthine, *Fr.;* Terpentin, *Germ.;* Trementina, *Ital., Span.*

The term *turpentine* is now generally applied to certain vegetable juices, liquid or concrete, which consist of resin combined with a peculiar essential oil, called the *oil of turpentine.* They are generally procured from different species of pine, though other trees afford products which are known by the same general title, as for instance, the *Pistacia Terebinthus*, which yields the Chian turpentine. Some of the French writers extend the name of turpentine to other juices consisting of resin and essential oil, as copaiba, balm of Gilead, &c. We shall describe particularly, in this place, only the officinal turpentines. A brief botanical view of the plants from which they are respectively derived, will be in accordance with the plan of the work.

Pinus. *Sex. Syst.* Monœcia Monadelphia.—*Nat. Ord.* Coniferæ.

Gen. Ch. Male. *Calyx* four-leaved. *Corolla* none. *Stamens* many. *Anthers* naked. Female. *Calyx* strobiles; scales two-flowered. *Corolla* none. *Pistil* one. *Nut* with a membranous wing. *Willd.*

The plants composing this genus are arranged by many botanists in three distinct genera, the *Pinus*, *Abies*, and *Larix*, of which the following characters are given by Lindley, in the Encyclopædia of Plants:—"1. Pinus.

Male. Anthers two-celled. *Female. Scales* in a conical cone, bracteate at base, digynous. *Pericarps* attached to the inside of scale, more or less winged, deciduous. *Stigmas* two or three-cleft. *Cotyledons* four to eight. —2. ABIES. The same as Larix, excepting its habit and stigma, which is that of Pinus. *Cotyledons* three to nine.—3. LARIX. *Male. Anthers* two-celled. *Female. Scales* imbricated, in a round cone, bracteate at base, digynous. *Pericarps* attached to the inside of scale, winged, deciduous. *Stigma* hemispherical, cupped, glandular. *Cotyledons* five to nine."—Though the distinction between these genera is sufficient to justify their establishment, we deem it best, in this work, to follow the authority of the Pharmacopœias which we have adopted as in some measure our standards, all of which adhere to the old genus Pinus. Besides the officinal species of pines, there is one, a native of this country, which affords a product considerably employed, though not recognised by the Pharmacopœias. The substance alluded to is the *essence of spruce*, prepared from the young branches of the *Pinus nigra* (Abies nigra), or *black spruce*, by boiling them in water, and evaporating the decoction. It is a thick liquid, having the colour and consistence of molasses, with a bitterish, acidulous, astringent taste. It is much used in the preparation of the beverage commonly known by the name of *spruce beer*, which is a pleasant and wholesome drink in summer, and useful in long sea-voyages as a preventive of scurvy.*

1. *Pinus palustris.* Willd. *Sp. Plant.* iv. 499.—*P. Australis.* Michaux, *N. Am. Sylv.* iii. 133. "Leaves in threes, very long; stipules pinnatifid, ramentaceous, persistent; strobiles sub-cylindrical, armed with sharp prickles."

This is a very large indigenous tree, growing in dry sandy soils from the southern part of Virginia to the Gulf of Mexico. Its mean elevation is sixty or seventy feet, and the diameter of its trunk about fifteen or eighteen inches for two-thirds of this height. The leaves are about a foot in length, of a brilliant green colour, and united in bunches at the ends of the branches. The names by which the tree is known in the Southern States, are *long-leaved pine*, *yellow pine*, and *pitch pine;* but the first is most appropriate, as the last two are applied also to other species. This tree furnishes by far the greater proportion of turpentine, tar, &c., consumed in the United States, or sent from this to other countries. (See *Pix Liquida.*)

2. *Pinus Tæda.* Willd. *Sp. Plant.* iv. 498; Michaux, *N. Am. Sylv.* iii. 156. "Leaves in threes, elongated, with elongated sheaths; strobiles oblong-conical, deflexed, shorter than the leaf; spines inflexed."

This is the *loblolly*, or *old field pine* of the Southern States. It is abundant in Virginia, where it occupies the lands which have been exhausted by cultivation. It exceeds eighty feet in height, has a trunk two or three feet in diameter, and expands into a wide-spreading top. The leaves are about six inches long, and of a light green colour. It yields turpentine in abundance, but less fluid than that which flows from the preceding species.

3. *Pinus sylvestris.* Willd. *Sp. Plant.* iv. 494; Woodv. *Med. Bot.* p. 1. t. 1; Michaux, *N. Am. Sylv.* iii. p. 125. "Leaves in pairs; rigid; strobiles ovate-conical, of the length of the leaves; scales echinate."

This species of pine, when of full size, is eighty feet high, with a trunk four or five feet in diameter. It inhabits the northern and mountainous parts of Europe. In Great Britain it is called the *wild pine*, or *Scotch fir;* the latter name having been applied to it from its abundance in the mountains of Scotland. It yields a considerable proportion of the common European turpentine.

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* The following is the formula usually followed. Take of essence of spruce *half a pint;* pimento bruised, ginger bruised, hops, each, *four ounces;* water *three gallons.* Boil for five or ten minutes: then strain, and add of warm water *eleven gallons;* yeast *a pint;* molasses *six pints.* Mix and allow the mixture to ferment for twenty-four hours.

4. *Pinus Balsamea.* Willd. *Sp. Plant.* iv. 504.—*Abies Balsamifera,* Michaux, *N. Am. Sylv.* iii. p. 191. "Leaves solitary, flat, emarginate or entire, glaucous beneath, somewhat pectinate, sub-erect above, recurved spreading; cones cylindrical, erect; bractes abbreviate, obovate, conspicuously mucronate, sub-serrulate."

This is the *American silver fir*, inhabiting Canada, Nova Scotia, Maine, and the mountainous regions further to the south. It is an elegant tree, seldom rising more than forty feet in height, with a tapering trunk, and numerous branches which diminish in length in proportion to their height, and form an almost perfect pyramid. The leaves are six or eight lines long, inserted in rows on the sides and tops of the branches, narrow, flat, rigid, bright green on their upper surface, and of a silvery whiteness beneath. The cones are large, erect, nearly cylindrical, of a purplish colour, and covered with a resinous exudation which gives them a glossy, rich, and beautiful appearance. It is from this tree that the *Canada balsam* is obtained.

5. *Pinus Larix.* Willd. *Sp. Plant.* iv. 503; Woodv. *Med. Bot.* p. 7. t. 4.—*Larix Europæa.* De Cand.—*Larix communis.* Lindley. "Leaves fasicled, deciduous; cones ovate-oblong; margins of the scales reflexed, lacerated; bractes panduriform."

The *European larch* is a large tree inhabiting the mountains of Switzerland, Germany, and the East of France. It yields the *Venice turpentine* of commerce, and a peculiar sweetish substance, called in France *Briançon manna*, which exudes spontaneously, and concretes upon its bark.

Pistacia. See MASTICHE.

Pistacia Terebinthus. Willd. *Sp. Plant.* iv. 752; Woodv. *Med. Bot.* p. 29. t. 12. This is a small tree, with numerous spreading branches, bearing alternate, pinnate leaves, which consist of three or four pairs of ovate lanceolate, entire, acute, smooth, and shining leaflets, with an odd one at the end. The male and female flowers are diœcious, small, and in branching racemes. This is a native of Barbary and Greece, and flourishes in the islands of Cyprus and Chio, the latter of which has given its name to the turpentine obtained from the tree.

We shall treat of the several varieties of turpentine under distinct heads.

1. White Turpentine.

Térébenthine de Boston, *Fr.;*

The common *American* or *white turpentine*, (*Terebinthina* of the United States Pharmacopœia,) is procured chiefly from the *Pinus palustris*, partly also from the *Pinus Tæda*, and perhaps some other species inhabiting the Southern States. In former times, large quantities were collected in New-England; but the turpentine trees of that section of the Union are said to be nearly exhausted; and our commerce is almost exclusively supplied from North Carolina, and the south-eastern parts of Virginia. The following is the process for obtaining the turpentine as described by Michaux. During the winter months, excavations of the capacity of about three pints are made in the trunk of the tree three or four inches from the ground. Into these the juice begins to flow about the middle of March, and continues to flow throughout the warm season, slowly at first, rapidly in the middle of summer, and more slowly again in the autumnal months. The liquid is removed from these excavations as they fill, and transferred into casks, where it gradually thickens, and ultimately acquires a soft solid consistence. Very large quantities are thus annually procured, sufficient not only to supply the whole consumption of this country, but also to furnish a valuable export.

White turpentine, as found in our shops, has a peculiar somewhat aromatic odour, a warm pungent bitterish taste, and a white colour tinged with yellow. It is somewhat translucent, and of a consistence which varies with the temperature. In the middle of summer it is almost semi-fluid and very adhesive, though brittle; in the winter it is often so firm and hard, as to be incapable of being made into pills without heat. Exposed to the air it ultimately becomes perfectly hard and dry. In the recent state it affords about seventeen per cent. of essential oil.

2. COMMON EUROPEAN TURPENTINE.

Térébenthine de Bordeaux, Terebenthine commune, *Fr.;* Gemeiner Terpentin, *Germ.;* Trementina comune, *Ital.;* Trementina comun, *Span.*

This is the *Terebinthina Vulgaris* of the British Pharmacopœias. It is furnished by several species of pine; but most abundantly by the *Pinus sylvestris.* In the maritime districts of the south-west of France, especially in the department of the Landes, it is obtained largely from the *Pinus maritima.* The process consists simply in making incisions into the trunk, or removing portions of the bark, and receiving the juice which flows out in small troughs, or in holes dug at the foot of the tree. It is purified by heating and filtering it through straw, or by exposing it to the sun in a barrel, through holes in the bottom of which, the melted turpentine escapes. Thus prepared it is whitish, turbid, thickish, and separates, upon standing, into two parts, one liquid and transparent, the other of a consistence and appearance like those of thickened honey. It is scarcely ever given internally, but furnishes large quantities of oil of turpentine and resin. We do not import it into this country. The substance which the French call *galipot* or *barras*, is that portion of the turpentine which concretes upon the surface of the wounds, and is removed during the winter. (*Thenard.*) This, when purified by melting with water and straining, takes the name of *yellow* or *white pitch*, or *Burgundy pitch.* When turpentine has been deprived of its oil by distillation, the resin which remains is called *rosin*, and sometimes *colophony*, from the Ionian city of that name, where it was formerly prepared. It is the yellow resin, *Resina Flava*, of the London Pharmacopœia. White resin, *Resina Alba*, is prepared by incorporating this, while in fusion, with a certain proportion of water. Tar, *Pix Liquida*, is the turpentine extracted from the wood by a slow combustion, and chemically altered by the heat. Common pitch, *Pix Nigra* or *Resina Nigra*, is the solid residue left after the evaporation by boiling of the liquid parts of tar. (See these titles respectively.)

3. CANADIAN TURPENTINE.

Canada balsam; Baume de Canada, *Fr.;* Canadischer Balsam, Canadischer Terpentin, *Germ.;* Trementina del Canadà, *Ital.*

This is the product of the *Pinus Balsamea*, and is collected in Canada and the State of Maine. It is procured, according to Michaux, by breaking the vesicles which naturally form upon the trunk and branches, and receiving their liquid contents in a bottle. When fresh, it is colourless or slightly yellowish, transparent, of the consistence of thin honey, very tenacious, of strong agreeable odour, and a bitterish, somewhat acrid taste. By time and exposure it becomes more yellow and thicker, and at last assumes a solid consistence. It is usually brought into market in bottles, and is kept in the shops under the name of *Canada balsam*, or *balsam of fir*. In Europe, it is sometimes called *balm of Gilead*, from its supposed resemblance to that celebrated medicine. The term *balsam*, as at present understood, is improperly applied to it; as it contains no benzoic acid, and is in fact a true turpentine, consisting of resin and essential oil. There is reason to believe that *Strasburg turpentine* is sometimes sold for it in the shops.

4. Venice Turpentine.

Térébenthine de mélèze, Térébenthine de Venise, *Fr.;* Venetianischer Terpentin, *Germ.;* Trementina di Venezia, *Ital.;* Trementina de Venecia, *Span.*

This turpentine received its name from the circumstance that it was formerly an extensive article of Venetian commerce. It is procured in Switzerland, and the French province of Dauphiny, from the *Pinus Larix* or larch, which grows abundantly upon the Alps and the Jura mountains. The peasants bore holes into the trunk about two feet from the ground, and conduct the juice by means of wooden gutters into small tubs, placed at a convenient distance. It is afterwards purified by filtration through a leather sieve. Genuine Venice Turpentine is more fluid than the other varieties, of a yellowish or slightly greenish colour, a strong not disagreeable odour, and a warm bitterish and acrid taste. As found in our shops it is usually quite brown, and is said to be a factitious substance, prepared by dissolving resin in oil of turpentine. Dr. A. T. Thomson states that much of the Venice turpentine of the shops of London is obtained from America. It is probably the same preparation as that which passes under the name in this country.

5. Chian Turpentine.

Tèrèbenthine de Chio, *Fr.;* Cyprischer Terpentin, *Germ.;* Trementina Cipria, *Ital.*

This variety of turpentine is collected chiefly in the Island of Chio or Scio, by incisions made during the summer in the bark of the *Pistacia Terebinthus*. The juice flowing from the wounds, falls upon smooth stones placed at the foot of the tree, from which it is scraped with small sticks, and allowed to drop into bottles. The annual product of each tree is very small; and the turpentine, therefore, commands a high price even in the place where it is procured. Very little of it reaches this country. It is said to be frequently adulterated with the other turpentines. It is a thick, tenacious, pellucid liquid, of a slightly yellowish colour, a peculiar penetrating odour more agreeable than that of the other substances of the same class, and a mild taste with little bitterness. On exposure to the air it speedily thickens, and ultimately becomes concrete and hard, in consequence of the loss of its volatile oil.

Besides the turpentines mentioned, various others are noticed in books on materia medica, though not found in the shops of this country. There is the *Strasburg turpentine*, much used in France, and obtained from the *Pinus Picea*, (*Abies pectinata* of De Candolle,) or European silver fir, which grows on the mountains of Switzerland and Germany, and bears a close resemblance, as well in its appearance as its product, to the *Pinus Balsamea* of Canada; the *Damarra turpentine*, which speedily concretes into a very hard resin, and is derived from the *Pinus Damarra* of Lambert, the *Agathis Damarra* of Richard, growing in the East India islands; and the *Dombeya turpentine*, a glutinous milky looking fluid of a strong odour and aste, derived from the *Dombeya excelsa*, the *Araucaria Dombeyi* of Richrd, which inhabits Chili, and is said to be identical with the Norfolk Island pine. These, with one or two other turpentines scarcely known or having a doubtful claim to the title, are all that belong properly to this class of vegetable products.

General Properties. The turpentines resemble each other in odour and taste, though distinguished by shades of difference. Liquid at first, they become thick and gradually solid by exposure, in consequence partly of the volatilization, partly of the oxidation of their essential oil. They are rendered more liquid or softened by heat, and at a high temperature take fire, burning with a white flame and much smoke. Water extracts only a minute proportion of their volatile oil. They are wholly soluble in alcohol and ether, and readily unite with the fixed oils. They yield by distillation a volatile oil, well known as the *oil of turpentine*, and leave a residue consisting exclusively of resin. (See *Oleum Terebinthinæ* and *Resina.*) A minute proportion of succinic acid passes over with the oil. From the experiments of M. Faure of Bordeaux it appears, that some of the liquid turpentines, like copaiba, may be solidified by the addition of magnesia. (*Journ. de Chim. Med.* 1830, p. 94.)

Medical Properties and Uses. The effects of the turpentines upon the system are dependent entirely on their essential oil. They are stimulant, diuretic, anthelmintic, and in large doses laxative. Whether taken internally, or applied to the skin, they communicate a violet odour to the urine, and if continued for some time produce an irritation of the mucous membrane of the urinary passages, amounting frequently to strangury. The last effect is less apt to be experienced when they operate upon the bowels. Externally applied they act as rubefacients. Their medical virtues were known to the ancients. At present they are less used than formerly, having been superseded by their volatile oil. They are, however, occasionally prescribed in leucorrhœa, gleet, and other chronic diseases of the urinary passages; in piles and chronic inflammations or ulcerations of the bowels; in chronic catarrhal affections; and in various forms of rheumatism, especially sciatica and lumbago. The white turpentine is usually employed in this country.

They may be given in the shape of pill made with powdered liquorice root; or in emulsion with gum Arabic or yolk of egg, loaf sugar, and water; or in electuary formed with sugar or honey. Their dose is from a scruple to a drachm. In the quantity of half an ounce or an ounce, triturated with the yolk of an egg, and mixed with half a pint of mucilaginous liquid, they form an excellent injection in cases of ascarides, and of constipation attended with flatulence.

Off. Prep. Oleum Terebinthinæ, *Dub.* W.

TESTA. *U.S.*

Oyster-shell.

Off. Syn. TESTÆ. *Lond.*

Ecailles des huîtres, *Fr.;* Austerschalen, *Germ.;* Gusci delle ostriche, *Ital.;* Cascaras, *Span.*

The common oyster is the *Ostrea edulis* of naturalists, an animal belonging to the class *Vermes*, order *Testacea*. It is found in many parts of the world, and is particularly abundant on our own coast, and in the bays of our large rivers. It consists of a soft pulpy portion, comprising the vital organs of the animal, enclosed in a hard bivalve shell, of the nature of mother-of-pearl. The meat of the oyster forms a very digestible and nutritious article of food, particularly suited to convalescents; but the shell only is officinal.

Properties. Oyster-shells are too familiarly known to require description. They are made up, like other mother-of-pearl shells, of alternate layers of earthy matter, and animal matter of the nature of coagulated albumen. According to the analysis of Bucholz and Brandes, their exact constituents are carbonate of lime 98.6, phosphate of lime 1.2, animal matter 0.5, alumina (accidental) 0.2=100.5. Thus it appears that the animal matter is present in but small amount. When calcined or burnt, the animal matter and carbonic acid are dissipated, and the shells are converted into a species of lime, called, in the arts, oyster-shell lime.

Pharmaceutical Uses. Oyster-shells require to be reduced to an impalpable powder, before they are fit for medicinal employment; and their preparation in this way constitutes their sole pharmaceutical use. When thus prepared, they form the *Testa Præparata*, under which head their medicina properties will be noticed.

Off. Prep. Testa Præparata, *U.S.*, *Lond.* B.

TOLUTANUM. *U.S.*

Tolu.

"Myroxylon Toluiferum. *Richard.* Myroxylon Peruiferum. *Willd.* Succus. *The juice.*" *U. S.*

Off. Syn. BALSAMUM TOLUTANUM. Toluifera Balsamum. Balsamum. *Lond.*; TOLUIFERÆ BALSAMI BALSAMUM. *Ed.*; TOLUIFERA BALSAMUM. Resina. *Dub.*

Balsam of Tolu; Baume de Tolu, *Fr.*; Tolubalsam, *Germ.*; Balsamo del Tolu, *Ital.*; Balsamo de Tolu, *Span.*

MYROXYLON. See MYROXYLON.

Till recently, the tree from which this balsam is derived, retained the name of *Toluifera Balsamum*, given to it by Linnæus; but it is now admitted that the genus *Toluifera* was formed upon insufficient grounds; and botanists agree in referring the Tolu balsam tree to the *Myroxylon.* Ruiz, one of the authors of the Flora Peruviana, considers it identical with the *Myroxylon Peruiferum;* and his opinion has been adopted by some other writers. M. Achille Richard, however, thinks it a distinct species, and has appropriately denominated it *Myroxylon Toluiferum*, a title which is recognised in the Pharmacopœia of the United States. Sprengel and Humboldt also consider it a distinct species of Myroxylon. According to Richard, who had an opportunity of examining specimens brought from South America by Humboldt, the leaflets of the *M. Peruiferum* are thick, coriaceous, acute, and blunt at the apex, and all equal in size; while in the *M. Toluiferum* the leaflets are thin, membranous, obovate, with a lengthened and acuminate apex, and the terminal one is longest. The *M. Peruiferum* is found in Peru and the southern parts of New Granada; the *M. Toluiferum* grows in Carthagena, and abounds especially in the neighbourhood of Tolu. The wood of the latter species, according to Humboldt, is of a deep red colour, has a delightful balsamic odour, and is much used for building. It is not improbable, that the two balsams known in the shops by the respective names of Peru and Tolu, differ more in the mode by which they are procured, than in the character of the trees which afford them.

The balsam of Tolu is procured by making incisions into the runk of the tree. The juice as it exudes is received in vessels of various kinds, in which it is allowed to concrete. It is brought from Carthagena in calabashes, or baked earthen jars of a peculiar shape, and sometimes in glass vessels.

Properties. As first imported, it has a soft, tenacious consistence, which varies considerably with the temperature. By age it becomes hard and brittle like resin. It is shining, translucent, of a reddish or yellowish-brown colour, a highly fragrant odour, and a warm, somewhat sweetish and pungent, but not disagreeable taste. Exposed to heat, it melts, inflames, and diffuses, while burning, its own peculiar smell, united with that of benzoic acid. It is entirely dissolved by alcohol, and the essential oils. Boiling water extracts its benzoic acid. Distilled with water it affords a small proportion of volatile oil; and if the heat be continued, benzoic acid sublimes. Mr. Hatchet states, that when dissolved in the smallest quantity of solution of potassa, it loses its own characteristic odour, and acquires that of the clove-pink. Its ingredients are resin, benzoic acid, and volatile oil, the proportions of which vary in different specimens. Guibourt observed that it contains more benzoic acid, and is less odorous in the solid form; and thinks that the acid is increased at the expense of the oil. Trommsdorff obtained 88 per cent. of resin, 12 of acid, and only 0.2 of volatile oil.

Medical Properties and Uses. Tolu is a stimulant tonic, with a peculiar tendency to the pulmonary organs. It is given with some advantage in chronic catarrh and other pectoral complaints, in which a gently stimulating expectorant is demanded; but should not be prescribed until after the reduction of inflammatory action. Independently of its medical virtues, its pleasant flavour renders it a popular ingredient of expectorant mixtures. Old and obstinate coughs are said to be sometimes greatly relieved by the inhalation of the vapour proceeding from an ethereal solution of this balsam.

From ten to thirty grains may be given at a dose, and frequently repeated. The best form of administration is that of emulsion, made by triturating the balsam with mucilage of gum Arabic and loaf sugar, and afterwards with water.

Off. Prep. Syrupus Tolutani, *Lond.*, *Ed.;* Tinctura Benzoini Composita, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Tinctura Tolutani, *U.S.*, *Ed.*, *Dub.* W.

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TORMENTILLA. *U.S. Secondary.*

Tormentil.

"Tormentilla erecta. Radix. *The root.*" *U.S.*

Off. Syn. TORMENTILLÆ RADIX. Tormentilla officinalis. Radix. *Lond.;* TORMENTILLÆ ERECTÆ RADIX. *Ed.;* TORMENTILLA OFFICINALIS. *Dub.*

Tormentille, *Fr.;* Tormentillwurzel, *Germ.;* Tormentilla, *Ital.;* Tormentila, *Span.*

TORMENTILLA. *Sex. Syst.* Icosandria Polygynia.—*Nat. Ord.* Rosaceæ.

Gen. Ch. Calyx eight-cleft. *Petals* four. *Seeds* roundish, naked, affixed to a small, juiceless receptacle. *Willd.*

By some modern writers this genus is united with the *Potentilla*, from which it differs only in having eight instead of ten divisions of the calyx, and four instead of five petals.

Tormentilla erecta. Willd. *Sp. Plant.* ii. 1112; Woodv. *Med. Bot.* p. 503. t. 181.—*T. Officinalis.* Smith, *Flor. Brit.; Pharm. Lond.*—*Poten-*

tilla Tormentilla. Nestler, *Monograph. des Potentilles.* The tormentil, or septfoil, is a small perennial plant, very common throughout Europe. The stems, which rise about six or eight inches in height, from a woody root, are slender, more or less erect, branching towards the top, and furnished with sessile leaves, which on the stalk usually consist of seven, on the branches of five, digitate, elliptical, villous, deeply serrated leaflets, three of which are larger than the others. The flowers are small, yellow, and solitary upon axillary peduncles. All parts of the plant are astringent, especially the root, which is the part employed. It is gathered in spring.

Properties. The root of tormentil is cylindrical or roundish, rather larger above than at the lower extremity, an inch or two in length, about the thickness of the finger, knotty, sometimes contorted, brown or blackish externally, and reddish within. It has a slight aromatic odour, and a very astringent taste. Tannin is an abundant constituent. There is also a red colouring principle, soluble in alcohol, but insoluble in water. The root is said to be used for tanning leather in the Orkneys and Western Islands of Scotland, and for staining leather red by the Laplanders. It yields all its medical virtues to boiling water.

Medical Properties and Uses. Tormentil is a simple and powerful astringent, applicable to all cases of disease in which this class of medicines is indicated. We seldom, however, employ it in this country, having indigenous plants of equal virtue. It may be given in substance, decoction, or extract. The dose of the powder is from thirty grains to a drachm. W.

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TOXICODENDRON. *U.S. Secondary.*

Poison-oak.

"Rhus toxicodendron. Folia. *The leaves.*" *U.S.*

Off. Syn. TOXICODENDRI FOLIA. Rhus Toxicodendron. Folia. *Lond.;* RHOIS TOXICODENDRI FOLIA. *Ed.;* RHUS TOXICODENDRON. Folia. *Dub.*

Sumac vènèneux, *Fr.;* Gift-Sumach, *Germ.;* Albero del veleno, *Ital.*

RHUS. See RHUS GLABRUM.

Admitting, as appears generally to be done at present, that the *Rhus Toxicodendron* and *Rhus radicans* of Linnæus, are mere varieties of the same plant, there are three indigenous species of Rhus which possess poisonous properties—the one above mentioned, the *R. Vernix*, commonly known by the name of *swamp sumach*, or *poison sumach*, and the *R. pumilum* of the Southern States. Though the first only is designated in the Pharmacopœia, we shall briefly describe the three species, as their medical effects are probably similar, and their operation upon the system such that the plants should be known to every practitioner.

1. *Rhus radicans.* Willd. *Sp. Plant.* i. 1481; Bigelow, *Am. Med. Bot.* iii. 17.—*R. Toxicodendron.* Pursh, *Fl. Am. Sept.* p. 205. Though Elliott and Nuttall consider the *R. radicans* and *R. Toxicodendron* as distinct species, the weight of botanical authority is on the other side, and Bigelow declares that he has "frequently observed individual shoots from the same stock, having the characters of both varieties." The difference, however, in their appearance; is sufficiently striking to have led to the adoption of different common names, the R. radicans being usually called *poison vine*, and the R. Toxicodendron, *poison oak.* The former has a climbing stem,

rising to a great height upon trees, rocks, and other objects, to which it adheres by strong rooting fibres, which it throws out from its sides. The leaves, which stand upon long footstalks, are ternate, with broad ovate or rhomboidal, acute leaflets, smooth and shining on both sides, sometimes slightly hairy on the veins beneath, entire, or irregularly lobed and toothed. The flowers are small, greenish-white, diœcious, and grow in lateral, usually axillary panicles, or compound racemes. The male flowers have five stamens, and the rudiments of a style; the female, which are of only half the size and on a different plant, have abortive stamens, and a short erect style, standing on a roundish germ, and terminating in three stigmas. The fruit consists of roundish, pale-green or whitish berries.

The *R. Toxicodendron*, or poison oak, has the form of a shrub from one to three feet high, with leaflets angularly indented, and pubescent beneath. But this character of the foliage is probably not constant; and the stunted growth may be owing to peculiarities of situation. Dr. Bigelow states that the young plants of the R. radicans do not put forth rooting fibres until they are several years old, and that they are influenced in this respect by the contiguity of supporting objects.

This species of Rhus grows in woods, fields, and along fences, from Canada to Georgia. It flowers in June and July. When wounded, it emits a milky juice, which becomes black on exposure to the air, and leaves upon linen or other cloth a stain, which cannot afterwards be removed by washing with soap and water, or by alcohol either hot or cold, but deepens by age. It has been proposed as an indelible ink. Ether dissolves it.

The juice applied to the skin frequently produces inflammation and vesication; and the same poisonous property is possessed by a volatile principle which escapes from the plant itself, and produces in persons who come into its vicinity an exeedingly troublesome erysipelatous affection, particularly of the face. Itching, redness, a sense of burning, tumefaction, vesicatiou, and ultimate desquamation, are some of the attendants of this poisonous action. The swelling of the face is sometimes so great as almost entirely to obliterate the features. The effects are experienced soon after exposure, and usually begin to decline within a week. A light cooling regimen, with saline purgatives, and the local use of cold lead-water, are the best remedies. All persons are not equally liable to the affection, and the great majority are wholly unsusceptible of it from any ordinary exposure.

2. *Rhus Vernix.* Willd. *Sp. Plant.* i. 1479; Bigelow, *Am. Med. Bot.* i. 96. The *swamp sumach* is a beautiful shrub or small tree, usually ten or fifteen feet high, but sometimes rising thirty feet. The bark of the trunk is dark gray, of the branches lighter, of the extreme twigs and petioles beautifully red. The leaves are pinnate, with four or five pairs of opposite leaflets, and an odd terminal one. These are oblong or oval, entire or slightly sinuated, acuminate, smooth, and except the one at the end, nearly sessile. The flowers, as in the preceding species, are diœcious. They are very small, greenish, and arranged in loose axillary panicles. The berries are small, roundish, and greenish-white.

The tree grows in swamps and low grounds, from Canada to Carolina, and flowers in June and July. It is thought to be identical with a species of Rhus which grows in Japan, and furnishes a fine black varnish, much used in that country. Dr. Bigelow found that the opaque whitish juice which exudes from our native plant when wounded, and which becomes permanently black on exposure, may be made to afford a brilliant, glossy, durable varnish, by boiling it sufficiently before applying it.

The *Rhus Vernix* produces, much more powerfully than the *R. radicans*, the poisonous effects already described. Persons coming within its influence are much more apt to be affected with the poison, and generally suffer more severely. The whole body is sometimes enormously swollen, and the patient for many days scarcely able to move; but the complaint almost always spontaneously subsides without destroying life. As in the former instance, the susceptibility to the influence of the poison is exceedingly various, and some persons may handle the plant with perfect impunity.

3. *Rhus pumilum.* Michaux, *Flor. Americ.* i. 182. This is a southern species, growing in Upper Carolina, and not more than a foot in height. It is characterized by its pubescent branches and petioles; its pinnate leaves, with many pairs of oval, nearly acuminate, incised dentate leaflets, downy beneath; and by its silky fruit. According to Pursh it is the most poisonous of the genus.

It is probable that all parts of the Rhus radicans (R. Toxicodendron) are possessed of active properties; but the leaves only are directed in the Pharmacopœia, under the title of Toxicodendron. These are inodorous, have a mawkish acrid taste, and yield their virtues to water. The presence of tannin and gallic acid has been detected in them; but they have not been accurately analyzed.

Medical Properties and Uses. These leaves appear to be stimulant and narcotic, producing when swallowed more or less irritation of the stomach and bowels, and promoting the secretory function of the skin and kidneys. Orfila found them to act in the manner of the acrid poisons, and to produce a stupifying effect upon the nervous system. They were successfully used by Du Fresnoy, in France, in the cure of obstinate cutaneous diseases. Dr. Anderson, of Hull in England, effected cures with the medicine in several cases of palsy. A sense of heat and pricking, with irregular twitchings, were excited by it in the affected parts. Dr. Horsfield, and other physicians of this country, have used it in consumption and dropsy, but not with any very encouraging success.

The dose of the leaves recommended by Dr. Anderson, was half a grain or a grain three times a day; but this is much too small. Dr. Duncan gave it in larger doses, with little other than a laxative effect. Dr. Horsfield administered a teacupful of the strong infusion without disadvantage. In France the extract is recommended in doses of fifteen or twenty grains, repeated two or three times a day, and gradually increased to one or two drachms. Some of Du Fresnoy's patients took an ounce without effect. The probability is, that the active principle is volatile, and that the extract is less efficient than the leaves themselves. The risk of experiencing the poisonous effects of the plant upon the system, will probably prevent its extensive employment as a remedy, unless it should prove much more useful than the trials hitherto made give us reason to expect. W.

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TRAGACANTHA. *U.S.*

Tragacanth.

"Astragalus verus. Succus concretus. *The concrete juice.*" *U. S.*

Off. Syn. TRAGACANTHA. Astragalus verus. Gummi. *Lond.;* STRAGALI TRAGACANTHÆ GUMMI. Ex variis Tragacanthæ peciebus. *Ed.;* TRAGACANTHA GUMMI. ASTRAGALUS CRETIUS. Gummi. *Dub.*

Gomme Adraganthe, *Fr.;* Tragant, *Germ.;* Dragante, *Ital.;* Gomo tragacanto, *Span.*

ASTRAGALUS. *Sex. Syst.* Diadelphia Decandria.—*Nat. Ord.* Leguminosæ.

Gen. Ch. Legume two-celled, more or less gibbous, with the lower suture turned inwards. *Carina* blunt. *Loudon's Encyc. of Plants.*

Numerous species belonging to this genus yield a gummy matter having the properties of tragacanth. The drug known in commerce by that name has been ascribed, on the authority of Tournefort, to the *A. Tragacantha* of Linnæus (*A. Creticus* of Lamarck), which grows in Crete and Ionia; and on that of Olivier to the *A. verus* which inhabits Asia Minor, Armenia, and Northern Persia. Labillardière described a species by the name of *A. gummifer*, which he found growing on Mount Libanus in Syria, and from which tragacanth exudes, though not that of commerce. Siéber denies that any one of these species yields the officinal tragacanth, which he ascribes to the *A. aristatus* growing in Anatolia, especially upon Mount Ida, where the gum is most abundantly collected. This plant, however, is not the *A. aristatus* of Villars, which, according to Sibthorp, furnishes tragacanth in Greece. (*Merat* and *De Lens.*) The fact seems to be, that the commercial drug is collected from various sources; and it is affirmed that all the species of Astragalus with thorny petioles are capable of producing it. These form a natural group, and so closely resemble each other, that botanists have found some difficulty in distinguishing them. As the *A. verus* is designated in the Pharmacopœia of the United States, and that of the London College, we shall briefly describe it.

Astragalus verus. Olivier, *Voy. dans l'Empire Ottoman*, v. 342. pl. 44. This is a small shrub, not more than two or three feet high, with a stem an inch in thickness, and numerous very closely crowded branches, covered with imbricated scales, and spines which are the remains of former petioles. The leaves, which are little more than half an inch long, consist of several pairs of opposite, villous, stiff, pointed leaflets, with a midrib terminating in a sharp yellowish point. The flowers are papilionaceous, small, yellow, axillary, aggregate, and furnished with cottony bractes. This species yields the gum collected in Persia, and thence transmitted southward to India through Bagdad and Bassora, northward to Russia, and westward to Aleppo.

Tragacanth exudes spontaneously during the summer from the stems and branches, hardening as it exudes, and assuming various forms, according to the greater or less abundance of the juice.

Properties. It is in tortuous, vermicular filaments, rounded or flattened, rolled up or extended, of a whitish or yellowish-white colour, somewhat translucent, resembling horn in appearance. Sometimes the pieces are irregularly oblong or roundish, and of a slightly reddish colour. It is hard and more or less fragile, but difficult of pulverization, unless exposed to a freezing temperature, or thoroughly dried, and powdered in a heated mortar. The powder is very fine and white. Tragacanth has no smell, and very little taste. Its sp. gr. is 1.384. Introduced into water it absorbs a certain proportion of that liquid, swells very much, and forms a soft adhesive paste, but does not dissolve. If agitated with an additional quantity of water, this paste forms a uniform mixture; but in the course of one or two days the greater part separates and is deposited, leaving a portion dissolved in the supernatant fluid. Tragacanth is wholly insoluble in alcohol. It appears to be composed of two different constituents, one soluble in water and resembling if not identical with gum Arabic, the other capable of swelling in water, but not dissolving. The latter, which, according to Bucholz, constitutes 43 per cent. of tragacanth, is ranked by some among the peculiar proximate principles with the title of *tragacanthin.* It is probably identical with *bassorin.* It has the property of becoming blue with iodine, which is not the case with bassorin; but this property is ascribed to the presence of a small quantity of insoluble starch. According to M. Guerin, 100 parts of tragacanth contain 53.3 parts of Arabin or pure gum, 33.1 of bassorin and insoluble starch, and 11.1 of water, and yield when burned 2.5 parts of ashes. To separate the soluble entirely from the insoluble part, requires agitation with separate portions of water, which are to be decanted and filtered; and the process is to be continued till water ceases to dissolve anything. Berzelius considers tragacanth as a variety of mucilage. (See *Linum.*)

Medical Properties and Uses. Tragacanth is demulcent, but on account of its difficult solubility, is not often given internally. The great viscidity which it imparts to water, renders it useful for the suspension of heavy insoluble powders; and it is also employed in pharmacy to impart consistence to troches, for which it answers better than gum Arabic.

Off. Prep. Confectio Opii, *U.S.*, *Lond.*, *Dub.;* Mucilago Astragali Tragacanthæ, *Ed.*, *Dub.;* Pulvis Tragacanthæ Compositus, *Lond.* W.

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TRIOSTEUM. *U.S. Secondary.*

Fever-root.

"Triosteum perfoliatum. Radix. *The root.*" *U.S.*

TRIOSTEUM. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Caprifoliaceæ.

Gen. Ch. *Calyx* five-cleft, persistent, nearly the length of the corolla; segments linear, acute. *Corolla* tubular, five-lobed, subequal, base nectariferous, gibbous. *Stigma* somewhat five-lobed, capitate. *Berry* three-celled, three-seeded, crowned with the calyx. *Nuttall.*

Triosteum perfoliatum. Willd. *Sp. Plant.* i. 990; Bigelow, *Am. Med. Bot.* i. 90; Barton, *Med. Bot.* i. 59. This plant is indigenous and perennial. Several stems usually rise from the same root. They are simple, erect, round, hairy, fistulous, herbaceous, and from one to four feet high. The leaves are opposite, large, mostly connate, oval, acuminate, entire, abruptly narrowed at the base, and pubescent on their under surface. The flowers are of a dull purple colour, axillary, sessile, rarely solitary, sometimes in pairs, generally in triplets or five together in the form of whorls. The germ is inferior, and the style projects beyond the corolla, into the tube of which the stamens are inserted. The berry is oval and of a deep orange colour, containing three hard, bony seeds.

The *fever-wort*, *fever-root*, or *wild ipecac*, as this plant is variously called, though not very abundant, is found in most parts of the United States, preferring a limestone soil and shady situations. Its flowers appear in June. The whole plant has a bitter taste; but the root is most active, and is the only officinal part.

It is horizontal, long, about three-quarters of an inch in diameter, thicker and tuberculated near the origin of the stem, of a yellowish or brownish colour externally, whitish within, and furnished with fibres which may be considered as branches of the main root. When dry it is brittle and easily pulverized. It has a sickening odour and a bitter nauseous taste. Both water and alcohol take up its active properties, which are retained in the extract.

Medical Properties and Uses. Fever-root is cathartic, and in large doses emetic. The late Professor Barton observed it also to produce a diuretic effect. The bark of the root is the part which has been usually employed. In the quantity of twenty or thirty grains it ordinarily acts upon the bowels; and may be given alone or in combination with calomel at the commencement of fevers. The extract may be given in half the dose. W.

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TRITICUM HYBERNUM. Seminum farina. *Dub.*

Wheat-flour.

Off. Syn. FARINA. Triticum hybernum. Farina. *Lond.*

Farine de froment, *Fr.;* Waizenmehl, *Germ.;* Farina di frumento, *Ital.;* Flor del trigo, Acemite, *Span.*

Triticum. *Sex. Syst.* Triandria Digynia.—*Nat. Ord.* Gramineæ.

Gen. Ch. *Calyx* two-valved, solitary, transverse, many-flowered, on a flexuose, toothed receptacle. *Rees's Cyclopædia.*

Triticum hybernum. Willd. *Sp. Plant.* i. 477. The *common winter wheat* has a fibrous root, and one or more erect, round, smooth, jointed stems, which rise from three to five feet in height, and are furnished with linear, pointed, entire, flat, many-ribbed, rough, somewhat glaucous leaves, and jagged bearded stipules. The flowers are in a solitary, terminal, dense, smooth spike, two or three inches long. The calyx is four-flowered, tumid, even, imbricated, abrupt, with a short compressed point. In the upper part of the spike it is more elongated; and in this situation the corolla is more or less awned. The grain is imbricated, in four rows.

The native country of wheat is unknown; but its cultivation is supposed to have spread from Sicily over Europe. It is now an object of culture in almost all countries which enjoy a temperate climate. Sown in the autumn, it stands the winter, and ripens its seed in the following summer. Numerous varieties have been produced by cultivation, some of which are usually described as distinct species. Among these may perhaps be ranked the *T. æstivum*, or spring wheat, distinguished by its long beards, and the *T. compositum*, or Egyptian wheat, by its compound spikes. It is asserted that the latter changes in Great Britain into the common single-spiked wheat. (*Loudon's Encyc.*) The seeds are too well known to need description. They are prepared for use by grinding and sifting, by which the interior farinaceous part is separated from the husk. The former is divided according to its fineness into different portions, but so far as regards its medical relations may be considered under one head, that of *farina* or *flour*. The latter is called *bran*, and constitutes from 25 to 33 per cent. according to the variety of wheat.

Flour is white, inodorous, and nearly insipid. Its chief constituents are starch, gluten, saccharine matter, and gum, the proportions of which are by no means constant. Vauquelin obtained, as an average product, from eight varieties of flour which he examined, 10.25 per cent. of water, 10.80 of gluten, 68.08 of starch, 5.61 of sugar, and 4.11 of gum. The ashes of wheat, which amount only to about 0.15 per cent., contain, according to Henry, superphosphates of soda, lime, and magnesia. The gummy substance found in wheat flour is not precisely identical with ordinary gum, as it contains nitrogen, and does not yield mucic acid by the action of nitric acid. The starch, which is by far the most abundant ingredient, is much employed in a separate state. (See *Amylum.*) The gluten, however, is not less important; as it is to the large proportion of this principle which wheat flour contains, that it owes its superiority over that of other grains for the preparation of bread. The *gluten* here alluded to is the substance first noticed as a distinct principle by Beccaria. It is the soft viscid fibrous mass which remains, when wheat flour, enclosed in a linen bag, is exposed to the action of a stream of water, and at the same time pressed with the fingers, till the liquor comes away colourless. But this has been ascertained to consist, in fact, of two different substances. An Italian chemist, of the name of Taddei, found that by boiling it in alcohol a portion was dissolved, while another portion remained unaffected. Considering these as distinct principles, he gave the name of *gliadine* to the soluble, and *zymome* to the insoluble portion. But he had been anticipated in his experiments by the German chemist Einhof, who appears to have established the fact, that the part of the glutinous mass left behind by alcohol is identical with *vegetable albumen*, while the dissolved portion only is strictly entitled to the appellation of *gluten*, which had been previously conferred on the whole mass. As these two principles are contained in numerous vegetable products, and as they are frequently referred to in this work, it is proper that they should be briefly noticed. They both contain nitrogen, and both, when left to themselves in a moist state, undergo putrefaction. From these circumstances, and from their close resemblance to certain proximate animal principles in chemical habitudes and relations, they are sometimes called in works on chemistry, *vegeto-animal substances*. They are separated from each other, as they exist in the mass originally denominated gluten, by boiling this mass with successive portions of alcohol, till the liquid, filtered while yet hot, ceases to become turbid on cooling. The gluten dissolves, and may be obtained by adding water to the solution, and distilling off the alcohol. Large cohering flakes float in the liquor, which, when removed, form a viscid elastic mass, consisting of the substance in question with some slight impurity. The part left behind by the alcohol is the albumen in a coagulated state.

Gluten, as thus procured, is a pale yellow, adhesive, elastic substance, which by drying becomes of a deeper yellow colour and translucent. It is almost insoluble in water, and quite insoluble in ether and in the oils both fixed and volatile. Hot alcohol dissolves it much more readily than cold; and from its solution in ordinary alcohol at the boiling temperature, it is precipitated unchanged when the liquor cools. It is soluble in the dilute acids, and in caustic alkaline solutions, in consequence of forming soluble compounds with the acids and alkalies. With the earths and metallic oxides it forms nearly insoluble compounds, which are precipitated when the earthy or metallic salts are added to the solution of gluten in liquid potassa. Corrosive sublimate precipitates it from its acid as well as alkaline solutions, and added in solution to moist gluten, forms with it a compound, which, when dry, is hard, opaque, and incorruptible. Gluten is also precipitated by infusion of galls. It bears a close resemblance to animal fibrin. Its name originated in its adhesive property. Gluten exists in most of the farinaceous grains, and in the seeds of some leguminous plants.

Vegetable albumen is destitute of adhesiveness, and when dried, is opaque, and of a white, gray, or brown colour. Before coagulation, it is soluble in water, but insoluble in alcohol. By heat it coagulates and becomes insoluble in water. It is dissolved by the solutions of the caustic alkalies. Most of the acids, if added to its solutions in excess, precipitate compounds of the acids respectively with the albumen, which, though soluble in pure water, are insoluble in that liquid when acidulated. It is not, however, precipitated by an excess of the phosphoric or acetic acid. Its relations with the earthy, and metallic salts are similar to those of gluten. Corrosive sublimate precipitates it from its solutions, except from those in phosphoric and acetic acids, and when added in a state of solution to moist albumen, forms with it a hard, opaque compound. It is also precipitated by infusion of galls. This principle derived its name from its very close resemblance to animal albumen. It is associated with gluten in most of the farinaceous grains, is a constituent of all the seeds which form a milky emulsion with water, and exists in all the vegetable juices which coagulate by heat.

The mixture of gluten and albumen which constitutes the gluten of Beccaria, exercises an important influence over starch, which, with the presence of water and the aid of a moderate heat, it converts partly into gum and partly into sugar. The production of saccharine matter in the germination of seeds, and in the formation of malt, which is an example of germination, is thus accounted for. The gluten itself becomes acid in the process, and loses the property of reacting on starch.

It is scarcely necessary to state, that bread is formed by making flour into a paste with the addition of yeast, setting it aside to ferment, and then exposing it to the heat of an oven. The fermentation excited by the yeast, is accompanied with the extrication of carbonic acid gas, which being retained by the tenacity of the gluten, forms innumerable little cells through the mass, and thus renders the bread light. It is important to recollect that common salt is always added; as this ingredient is incompatible with some of the substances which are occasionally directed to be made into pills with the crumb of bread.

Medical Properties and Uses. Wheat flour in its unaltered state is seldom used in medicine. It is sometimes sprinkled on the skin in erysipelatous inflammation, and various itching or burning eruptions, particularly the nettle-rash; though rye flour is generally preferred for this purpose.

In the state of bread it is much more employed. An infusion of toasted bread in water is a pleasant, somewhat nutritive drink, very well adapted to febrile complaints. Within our experience, no drink has been found more grateful in such cases than this infusion, sweetened with a little molasses, and flavoured by lemon-juice. Boiled with milk, bread constitutes the common suppurative poultice, which may be improved by the addition of a small proportion of perfectly fresh lard. Slices of it steeped in lead-water, or the crumb mixed with the fluid and confined within a piece of gauze, afford a convenient mode of applying this preparation to local inflammations. The crumb—*mica panis*—is, moreover, frequently used to give bulk to minute doses of very active medicines administered in the form of pill. It should be recollected, however, that the common salt which it contains is wholly incompatible with the nitrate of silver, which is frequently prescribed in this way, and the dose of which is so minute that no loss can be afforded.

Bran is sometimes used in decoction, as a demulcent in catarrhal affections and complaints of the bowels. It has, when taken in substance, laxative properties, and is used by some persons habitually and with great advantage to prevent costiveness. Bran bread, made from the unsifted flour, forms an excellent laxative article of diet in some dyspeptic cases. The action of the bran is probably altogether mechanical, consisting in the irritation produced upon the mucous membrane of the stomach and bowels by its coarse particles.

Off. Prep. Cataplasma Fermenti, *Lond.*, *Dub.* W.

TUSSILAGO. *Lond.*

Coltsfoot.

"Tussilago Farfara." *Lond.*

Off. Syn. TUSSILAGINIS FARFARÆ FLORES et FOLIA. *Ed.;* TUSSILAGO FARFARA. Folia. Flores. *Dub.*

Tussilage, Pas d'âne, *Fr.;* Gemeiner Huflattig, *Germ.;* Tossilagine, *Ital.;* Tusilago, *Span.*

Tussilago. *Sex. Syst.* Syngenesia Superflua.—*Nat. Ord.* Compositæ Corymbiferæ.

Gen. Ch. Receptacle naked. *Pappus* simple. *Calyx* scales equal, as long as the disk, submembranaceous. *Florets of the ray* ligulate or toothless. *Willd.*

Tussilago Farfara. Willd. *Sp. Plant.* iii. 1967; Woodv. *Med. Bot.* p. 45. t. 18. Coltsfoot is a perennial herb, with a creeping root, which early in the spring sends up several leafless, erect, simple, unifloral scapes or flower-stems, five or six inches high, and furnished with appressed scale-like bractes of a brownish-pink colour. The flower, which stands singly at the end of the scape, is large, yellow, compound, with hermaphrodite florets in the disk, and female florets in the ray. The latter are numerous, linear, and twice the length of the former. The leaves do not make their appearance until after the flowers have blown. They are radical, petiolate, large, cordate, angular and toothed at the margin, bright green upon their upper surface, white and downy beneath.

The plant grows spontaneously both in Europe and North America. In this country it is found upon the banks of streams in the Middle and Northern States, and flowers in April. The whole of it is directed by the London College, the leaves and flowers only by those of Edinburgh and Dublin. The leaves are most frequently employed. They should be gathered after their full expansion, but before they have attained their greatest magnitude. (*London Dispensatory.*)

The flowers have an agreeable odour, which they retain after desiccation. The dried root and leaves are inodorous, but have a rough bitterish mucilaginous taste. Boiling water extracts all their virtues.

Medical Properties and Uses. Coltsfoot exercises little sensible influence upon the human system. It is, however, demulcent, and is sometimes used in chronic coughs, consumption, and other affections of the lungs. The expectorant properties which it was formerly thought to possess are not obvious. The leaves were smoked by the ancients in pulmonary complaints; and in some parts of Germany they are at the present time said to be substituted for tobacco. Cullen states that he found the expressed juice of the fresh leaves, taken to the extent of some ounces every day, beneficial in several cases of scrofulous sores; and a decoction of the dried leaves, as recommended by Fuller, answered a similar purpose, though it often failed to effect a cure.

The usual form of administration is that of decoction. An ounce or two of the plant may be boiled in two pints of water to a pint, of which a teacupful may be given several times a day. W.

ULMI CORTEX. *Lond.*

Elm Bark.

"Ulmus campestris. Liber. *The inner bark.*" *Lond.*

Off. Syn. ULMI CAMPESTRIS CORTEX. Cortex interior. *Ed.*; ULMUS CAMPESTRIS. Cortex interior. *Dub.*

Ecorce d'orme, *Fr.;* Ulmenrinde, *Germ.;* Scorza del olmo, *Ital.;* Corteza de olmo, *Span.*

Ulmus. *Sex. Syst.* Pentandria Digynia.—*Nat. Ord.* Amentaceæ, *Juss.*; Ulmaceæ, *Mirbel, Lindley.*

Gen. Ch. Calyx five-cleft. *Corolla* none. *Capsule* (*Samara*) compressed, membranaceous. *Willd.*

Ulmus campestris. Willd. *Sp. Plant.* i. 1324; Woodv. *Med. Bot.* p. 710. t. 242. This species of elm is characterized by its doubly serrate leaves, unequal at their base, by its nearly sessile, clustered, pentandrous flowers, and its smooth fruit. It is a large tree, with strong spreading branches, and a rough, cracked bark. It is a native of Europe, where the wood is highly esteemed for certain purposes in the arts.

The inner bark of its young branches, which is the officinal portion, is thin, tough, of a brownish-yellow colour, inodorous, and of a mucilaginous bitterish taste. It imparts to water its taste and mucilaginous properties. The tincture of iodine indicates the presence of starch. A peculiar vegetable principle called *ulmin*, now believed to be a constituent of most barks, was first discovered in the matter which spontaneously exudes from the bark of the European elm. It is a dark-brown almost black substance, without smell or taste, insoluble in cold water, sparingly soluble in boiling water which it colours yellowish-brown, soluble in alcohol, and readily dissolved by alkaline solutions.

Medical Properties and Uses. The bark of the European elm is demulcent, and said to be diuretic. It has been recommended in cutaneous affections of the leprous and herpetic character; but is not at present very highly esteemed. It is usually given in the form of decoction, and must be long continued to produce beneficial results.

Off. Prep. Decoctum Ulmi, *Lond.*, *Dub.* W.

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ULMUS. *U.S.*

Slippery Elm Bark.

"Ulmus fulva. Liber. *The inner bark.*" *U.S.*

Ulmus. See ULMI CORTEX.

Ulmus fulva. Michaux, *Flor. Americ.* i. 172.—*Ulmus rubra.* F. Andrew Michaux, *N. Am. Sylv.* iii. 89. The *slippery elm*, called also *red elm*, is a lofty tree, rising fifty or sixty feet in height, with a stem fifteen or twenty inches in diameter. The bark of the trunk is brown, that of the branches rough and whitish. The leaves are oblong ovate, acuminate, nearly equal at the base, unequally serrate, pubescent and very rough on both sides, four or five inches in length by two or three in breadth, and supported on short footstalks. The buds, a fortnight before their development, are covered with a dense russet down. The flowers, which appear before the leaves, are sessile, and in clusters at the extremity of the young shoots. The bunches of flowers are surrounded by scales, which are downy like the buds. The calyx also is downy. There is no corolla. The stamens are five in number, short, and of a pale rose colour. The fruit is a membranaceous capsule or samara, enclosing in the middle one round seed, destitute of fringe.

This species of elm is indigenous, growing in all parts of the United States north of Carolina, but most abundantly west of the Alleghany mountains. It flourishes in open, elevated situations, and requires a firm dry soil. From the white elm, *U. Americana*, it is distinguished by its rough branches, its larger, thicker, and rougher leaves, its downy buds, and the character of its flowers and seeds. Its period of flowering is in April. The inner bark is the part used in medicine, and is brought to the shops separated from the epidermis.

It is in long, nearly flat pieces, from one to two lines in thickness, of a fibrous texture, a tawny colour which is reddish on the inner surface, a peculiar sweetish not unpleasant odour, and a highly mucilaginous taste when chewed. By grinding, it is reduced to a light, grayish-fawn coloured powder. It abounds in mucilaginous matter, which it readily imparts to water.

Medical Properties and Uses. Slippery elm bark is an excellent demulcent, applicable to all cases in which this class of medicines is employed. It is especially recommended in dysentery, diarrhœa, and diseases of the urinary passages. Like the bark of the common European elm, it has been employed in leprous and herpetic eruptions; but neither in these nor in any other complaints does it probably exert any greater powers than such as belong to the demulcents generally. Its mucilage is highly nutritious; and we are told that it has proved sufficient for the support of life in the absence of other food. The instance of a soldier is mentioned, who lived for ten days in the woods on this bark and sassafras; and the Indians are said to resort to it for nutriment in extreme emergencies.

It is usually employed as a drink in the form of infusion. (See *Infusum Ulmi.*) The powder may be used, stirred in hot water, with which it forms a mucilage, more or less thick according to the proportion added. The bark also serves as an emollient application, in cases of external inflammation. For this purpose the powder may be formed into a poultice with hot water, or the bark itself may be applied, previously softened by boiling.

Off. Prep. Infusum Ulmi, *U. S.* W.

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UVA PASSA. *U.S.*

Raisins.

"Vitis vinifera. Fructus siccatus. *The dried fruit.*" *U.S.*

Off. Syn. UVÆ PASSÆ. *Lond.;* VITIS VINIFERÆ FRUCTUS. Fructus siccatus. *Ed;* VITIS VINIFERA. Fructus siccatus. *Dub.*

Raisins secs, *Fr.;* Rosinen, *Germ.;* Uve passe, *Ital.;* Pasas, *Span.*

VITIS. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Vites.

Gen. Ch. *Petals* cohering at the apex, withering. *Berry* five-seeded, superior. *Willd.*

Vitis vinifera. Willd. *Sp. Plant.* i. 1180; Woodv. *Med. Bot.* p. 144. t. 57. The vine is too well known to require description. This particular species is distinguished by the character of its leaf, which is lobed, sinuated, and naked or downy. The leaves and tendrils are somewhat astringent, and were formerly used in diarrhœa, hemorrhages, and other morbid discharges. The juice which flows from the stem was also thought to be possessed of medicinal virtues, and the prejudice still lingers among the vulgar in some countries. The unripe fruit has a harsh sour taste, and yields by expression a very acid liquor, called *verjuice*, which was much esteemed by the ancients as a refreshing drink, when diluted with water. It contains malic and tartaric acids. The grape, when quite ripe, is among the most pleasant and grateful fruits brought upon the table, and is admirably adapted, by its refreshing properties, to febrile complaints. If largely taken, it proves diuretic and gently laxative. The ripe fruit differs from the unripe in containing more sugar and less acid, though never entirely destitute of the latter. A peculiar acid has been found in grapes called by some chemists *racemic acid*, by Berzelius *paratartaric acid*, from its resemblance to the tartaric, with which it agrees in composition, though differing from it in properties.

The plant is supposed to have been derived originally from Asia; but it has been cultivated in Europe and Northern Africa from the remotest antiquity; and is now spread over all the temperate civilized regions of the globe. The fruit is exceedingly influenced by soil and climate; and the varieties which have resulted from culture or situation are innumerable. Those which yield the raisins of commerce are confined to the basin of the Mediterranean.

Raisins are prepared either by partially cutting the stalk of the bunches before the grapes are perfectly ripe, and allowing them to dry upon the vine; or by picking them in their mature state, and steeping them for a short time previous to desiccation in an alkaline ley. Those cured by the first method are most highly esteemed.

Several varieties of raisins are known in commerce. The best of those brought to this country are the *Malaga* raisins, imported from Spain. They are large and fleshy, of a purplish-brown colour, and sweet agreeable taste. Those produced in Calabria are similar. The *Smyrna* raisins are also large, but of a yellowish-brown colour, slightly musky odour, and less agreeable flavour. They are originally brought from the coast of Syria. The *Corinthian raisins*, or *currants* as they are commonly called in this country, are small, bluish-black, of a fatty appearance, with a vinous odour, and a sweet slightly tartish taste. Their name was derived from the city in the vicinity of which they were formerly cultivated; at present they are procured chiefly from Zante, Cephalonia, and the other Ionian Islands. In the older Pharmacopœias they are distinguished by the title of *uvæ passæ minores*.

Raisins contain a larger proportion of sugar than recent grapes. This principle, indeed, is often so abundant that it effloresces on the surface, or concretes in separate masses within the substance of the raisin. The *sugar of grapes* differs slightly from that of the cane, and is said to be identical with that produced by the action of sulphuric acid upon starch. It is less sweet than common sugar, less soluble in cold water, much less soluble in alcohol, and forms a syrup of less consistence.

Medical Properties and Uses. The chief medical use of raisins is to flavour demulcent beverages. Taken in substance they are gently laxative; but are also flatulent and difficult of digestion; and when largely eaten sometimes produce unpleasant effects, especially in children.

Off. Prep. Decoctum Althææ, *Ed.*, *Dub.;* Decoctum Guaiaci Compositum, *Ed.;* Decoctum Hordei Compositum, *Lond.*, *Dub.;* Tinctura Cardamomi Composita, *Lond.;* Tinctura Rhei et Sennæ, *U.S.;* Tinctura Sennæ, *Lond.* W.

UVA URSI. *U. S.*

Uva Ursi.

"Arbutus uva ursi. Folia. *The leaves.*" *U.S.*

Off. Syn. UVÆ URSI FOLIA. Arbutus Uva Ursi. Folia. *Lond.;* ARBUTI UVÆ URSI FOLIA. *Ed.;* UVA URSI. ARBUTUS UVA URSI. Folia. *Dub.*

Busserole, Raisin d'ours, *Fr.;* Bärentraubc, *Germ.;* Corbezzolo, Uva Ursina, *Ital.;* Gayuba, *Span.*

Arbutus. *Sex. Syst.* Decandria Monogynia.—*Nat. Ord.* Ericeæ.

Gen. Ch. *Calyx* five-parted. *Corolla* ovate, with a mouth, pellucid at the base. *Berry* five-celled. *Willd.*

Arbutus Uva Ursi. Willd. *Sp. Plant.* ii. 618; Bigelow, *Am. Med. Bot.* i. 66.—*Arctostaphylos Uva Ursi.* Adanson; Sprengel.—The *uva ursi*, or *bearberry*, is a low evergreen shrub, with trailing stems, the young branches of which rise obliquely upwards for a few inches. The leaves are scattered, upon short petioles, obovate, acute at the base, entire, with a rounded margin, thick, coriaceous, smooth, shining, and of a deep green colour on their upper surface, paler and covered with a net-work of veins beneath. The flowers, which stand on short reflexed peduncles, are collected in small clusters at the ends of the branches. The calyx is small, five-parted, of a reddish colour, and persistent. The corolla is ovate or urceolate, reddish-white, or white with a red lip, transparent at the base, contracted at the mouth, and divided at the margin into five short reflexed segments. The stamens are ten, with short filaments and bifid anthers; the germ round, with a style longer than the stamens, and a simple stigma. The fruit is a small, round, depressed, smooth, glossy, red berry, containing an insipid mealy pulp, and five cohering seeds.

This humble but hardy shrub inhabits the northern latitudes of Europe, Asia, and America. It is also found in the lofty mountains of Southern Europe, such as the Pyrennees and the Alps; and, on the American continent, extends from Hudson's Bay as far southward as New Jersey, in some parts of which it grows in great abundance. It prefers a barren soil, flourishing on gravelly hills, and elevated sandy plains. The leaves are the only part used in medicine. They were formerly imported from Europe; but are now collected chiefly within our own limits; and the market of Philadelphia is supplied exclusively from New Jersey. They should be gathered in autumn, and the green leaves only selected.

In Europe the uva ursi is often adulterated with the leaves of the *Vaccinium Vitis Idæa*, which are wholly destitute of its peculiar properties, and may be distinguished by their rounder shape, their revolute edges which are sometimes slightly toothed, and the appearance of their under surface, which is dotted, instead of being reticulated as in the genuine leaves. These distinguishing characters are given, as parcels of the drug may sometimes reach this country from abroad. Leaves of the *Chimaphila umbellata* may sometimes be found among the uva ursi as it exists in our own markets. They may be readily detected by their greater length, their cuneiform lanceolate shape, and their serrate edges.

The leaves of the uva ursi are inodorous when fresh, but acquire a smell not unlike that of hay when dried and powdered. Their taste is bitterish strongly astringent, and ultimately sweetish. They afford a light brown, greenish-yellow powder. Water extracts their active principles, which are also soluble in officinal alcohol. Among their ingredients are tannin, bitter extractive, resin, gum, and gallic acid; and the tannin is so abundant that they are used for tanning in some parts of Russia. Neither this principle nor gallic acid exists in the leaves of the *Vaccinium Vitis Idæa.*

Medical Properties and Uses. Uva ursi is astringent and tonic, and is thought by some to have a specific direction to the urinary organs, for the complaints of which it is chiefly used. Others deny that it possesses any peculiar tendency of this kind, and ascribe all its effects to its astringent and tonic action. Though known to the ancients, it had passed into almost entire neglect, till its use was revived by De Haen about the middle of the last century. It has acquired some reputation as an antilithic, and has undoubtedly been serviceable in gravel, probably by giving tone to the digestive organs, and preventing the accumulation of principles calculated to produce a secretion or precipitation of calculous matter. In chronic nephritis it is also a popular remedy, and is particularly recommended when there is reason to conjecture the existence of ulceration in the kidneys, bladder, or urinary passages. Diabetes, catarrh of the bladder, incontinence of urine, gleet, leucorrhœa, and menorrhagia, are also among the diseases in which it has occasionally proved serviceable; and testimony is not wanting to its beneficial effects in phthisis pulmonalis. The dose of the powder is from a scruple to a drachm, to be repeated three or four times a day; but the form of decoction is usually preferred. (See *Decoctum Uvæ Ursi.*)

Off. Prep. Decoctum Uvæ Ursi, *U.S.* W.

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VALERIANA. *U.S.*

Valerian.

"Valeriana officinalis. Radix. *The root.*" *U. S.*

Off. Syn. VALERIANÆ RADIX. Valeriana officinalis (sylvestris.) Radix. *Lond.;* VALERIANÆ OFFICINALIS RADIX. *Ed.;* VALERIANA OFFICINALIS. Radix. *Dub.*

Valériane, *Fr.;* Wilde Baldrianwurzel, *Germ.;* Valeriana silvestre, *Ital.;* Valerian silvestre, *Span.*

VALERIANA. *Sex. Syst.* Triandria Monogynia.—*Nat. Ord.* Valerianeæ, *De Cand., Lindley.*

Gen. Ch. Calyx very small, finally enlarged into a feathery pappus. *Corolla* monopetalous, five-lobed, regular, gibbous at the base. *Capsule* one-celled. (*Loudon's Encyc. of Plants.*) *Stamens* exserted, one, two, three, and four. (*Nuttall.*)

Valeriana officinalis. Willd. *Sp. Plant.* i. 177; Woodv. *Med. Bot.* p. 77, t. 32. The *officinal*, or *great wild valerian*, is a large handsome herbaceous plant, with a perennial root, and an erect, round, channeled stem, from two to four feet high, furnished with opposite pinnate leaves, and terminating in flowering branches. The leaves of the stem are attached by short broad sheaths, the radical leaves are larger and stand on long footstalks. In the former the leaflets are lanceolate and partially dentate, in the latter elliptica and deeply serrate. The flowers are small, white or rose-coloured, odorous and disposed in terminal corymbs, interspersed with spear-shaped pointed bractes. The number of stamens in this species is three. The fruit is a capsule containing one oblong ovate, compressed seed.

The plant is a native of Europe, where it grows either in damp woods and meadows, or on dry elevated grounds. As found in these different situations, it presents characters so distinct as to have induced some botanists to make two varieties. That which affects a dry soil is not more than two feet high, and is distinguished by its narrow leaves. It is superior to the other variety in medicinal virtue.

The root, which is the officinal portion, is collected in spring before the stem begins to shoot, or in the autumn when the leaves decay. It should be dried quickly, and kept in a dry place. It consists of numerous long, slender, cylindrical fibres, issuing from a tuberculated head. As brought to this country it frequently has portions of the stem attached. The best comes from England.

Properties. The colour of the root is externally yellowish or brown, internally white. The powder is yellowish-gray. The odour, which in the fresh root is slight, in the dried is strong and highly characteristic, and though rather pleasant to many persons, is very disagreeable to others. Cats are said to be strongly attracted by it. The taste is at first sweetish, afterwards bitter and aromatic. Valerian yields its active properties to water and alcohol. Trommsdorf found it to consist of 1.2 parts of volatile oil; 12.5 of a peculiar extractive matter, soluble in water, insoluble in ether and alcohol, and precipitated by metallic solutions; 18.75 of gum; 6.25 of a soft odorous resin; and 63 of lignin. Of these constituents the most important is the essential oil, in which the virtues of the root chiefly reside. It is of a pale greenish colour, of the sp. gr. 0.934, with a pungent odour of valerian, and an aromatic taste. It becoms yellow and viscid by exposure. Trommsdorf has ascertained that it contains a peculiar volatile acid, upon which the name of *valerianic acid* has been conferred. This, when separated from the oil, is a colourless liquid, of an oleaginous consistence, having an odour analogous to that of valerian, and a very strong, sour, disagreeable taste. It combines with salifiable bases, forming salts, which retain, in a diminished degree, the odour of the acid. (*Journ. de Pharm.* xx. 316.)

The roots of the *Valeriana Phu* and *V. dioica* are said to be sometimes mingled with those of the officinal plant; but the adulteration is attended with no serious consequences, as though much weaker than the genuine valerian, they possess similar properties. The same cannot be said of the roots of several of the *Ranunculaceæ*, which, according to Ebermayer, are sometimes fraudulently substituted in Germany. They may be readily detected by their want of the peculiar odour of the officinal root.

Medical Properties and Uses. Valerian is gently stimulant, with an especial direction to the nervous system, but without narcotic effect. In large doses it produces a sense of heaviness and dull pain in the head. It is useful in cases of irregular nervous action, when not connected with inflammation or an excited condition of the system. Among the complaints in which it has been particularly recommended, are hysteria, hypochondriasis, epilepsy, hemicrania, and low forms of fever attended with restlessness, morbid vigilance, or other symptoms of nervous derangement. It has also been used in intermittents combined with Peruvian bark. At best, however, it is an uncertain remedy. It may be given in powder or infusion. In the latter form, it is said by Professor Jœrg of Leipsic, who has experimented with it, to be less apt to irritate the alimentary canal than when administered in substance. The dose of the powder is from thirty to ninety grains, repeated three or four times a day. The tincture is also officinal. As the virtues valerian reside chiefly in the volatile oil, the medicine should not be given in decoction or extract. The distilled water is used on the continent of Europe; and the volatile oil is occasionally substituted with advantage for the root. The dose of the oil is four or five drops.

Off. Prep. Infusum Valerianæ, *U.S.*, *Dub.;* Tinctura Valerianæ, *U.S.*, *Lond.*, *Dub.;* Tinctura Valerianæ Ammoniata, *U. S.*, *Lond.*, *Ed.*, *Dub.*

W.

VERATRUM ALBUM. *U.S.*

White Hellebore.

"Veratrum album. Radix. *The root.*" *U.S.*

Off. Syn. VERATRI RADIX. Veratrum album. Radix. *Lond.;* VERATRI ALBI RADIX. *Ed.;* VERATRUM ALBUM. Radix. *Dub.*

Ellébore blanc, *Fr.;* Weisse Niesswurzel, *Germ.;* Elleboro bianco, *Ital.;* Veratro blanco, *Span.*

VERATRUM. *Sex. Syst.* Polygamia Monœcia. — *Nat. Ord.* Junci, *Juss.;* Melanthaceæ, *R. Brown, Lindley.*

Gen. Ch. HERMAPHRODITE. *Calyx* none. *Corolla* six-petaled. *Stamens* six. *Pistils* three. *Capsules* three, many-seeded. MALE. *Calyx* none. *Corolla* six-petaled. *Stamens* six. *Pistils* a rudiment. *Willd.*

Botanists who reject the class *Polygamia* of Linnæus, place this genus in the class and order *Hexandria Trigynia*, with the following character. "Polygamous. *Corolla* six-parted, spreading, segments sessile and without glands. *Stamens* inserted upon the receptacle. *Capsules* three, united, many-seeded." *Nuttall.*

Besides the *Veratrum album*, and *V. viride*, which are officinal plants, another species—the *Veratrum Sabadilla*—is noticed in medical works. It is a Mexican plant, and is interesting chiefly as the source of a drug known by the name of *cevadilla.* This is the fruit of the plant, and consists of yellowish, inodorous, bitterish, oblong capsules, three or four lines in length, with three cells, each containing two black, elongated, pointed, somewhat wrinkled seeds, of an extremely acrid and even caustic taste. It is imported from Mexico, and is used chiefly for the preparation of veratria. It is the principal ingredient of the *pulvis Capucinorum*, sometimes used in Europe for the destruction of vermin in the hair. As an internal remedy it has been used in worms, and various nervous complaints; but its poisonous properties require that it should be employed with great caution. Externally applied, it is said to be corrosive.

Veratrum album. Willd. *Sp. Plant.* iv. 895; Woodv. *Med. Bot.* p. 754. t. 257. This is an herbaceous plant, with a perennial, fleshy, fusiform root, yellowish-white externally, pale yellowish-gray within, and beset with long cylindrical fibres of a grayish colour. The stem is three or four feet high, thick, round, erect, and furnished with alternate leaves, which are oval, acute, entire, plaited longitudinally, about ten inches long by five in breadth, of a yellowish-green colour, and embrace the stem at their base. The flowers are greenish, and arranged in a terminal panicle.

The white hellebore is a native of the mountainous regions of continental Europe, and abounds in the Alps and Pyrennees. All parts of the plant are said to be acrid and poisonous; but the root only is officinal. This is brought to us from Germany in the dried state, in pieces from one to three inches long by an inch or less in mean diameter, cylindrical or in the shape of a truncated cone, internally whitish, externally blackish, wrinkled, and rough with the remains of the fibres which have been cut off near their origin. Sometimes the fibres continue attached to the root. They are numerous, yellowish, and of the size of a crow's quill.

Properties. The fresh root has a disagreeable odour, which is lost by drying. The taste is at first sweetish, afterwards bitterish, acrid, burning, and durable. The powdered root is grayish. Analyzed by Pelletier and Caventou, white hellebore was found to contain an oily matter consisting of elaïn, stearin, and a volatile acid; supergallate of *veratria;* a yellow colouring matter; starch; gum; lignin; silica, and various salts of lime and potassa. The medicinal properties of the root reside in the *veratria*, which was first discovered in the seeds of the *Veratrum Sabadilla*, and probably exists in other plants belonging to the same family. It is combined in the native state with an excess of gallic acid. As it may possibly come into use as a substitute for the more or less uncertain remedies of which it is the active ingredient, it deserves a particular notice in this place.

The process originally employed for obtaining veratria is difficult and yields but a small product. The following is recommended by M. Couerbe. An alcoholic extract of cevadilla, obtained by treating this substance with boiling alcohol and evaporating the tincture, is to be boiled with water acidulated with sulphuric acid until the liquid ceases to receive colour, or till a mineral alkali introduced into it, no longer occasions any sign of precipitation. To the solution of impure sulphate of veratria thus obtained, a solution of potassa or ammonia is to be added, and the resulting precipitate is to be treated with boiling alcohol and animal charcoal. The alcoholic solution, being filtered and evaporated, will yield the veratria sufficiently pure for medical use. A drachm of it, in this state, may be procured from a pound of cevadilla. But M. Couerbe has shown, that, besides *veratria*, there are at least two other distinct principles in this product, one of which, possessing alkaline properties, he calls sabadilline (*sabadillia*), and the other he proposes to name *veratrin.* These are separated in the following manner. Into the solution of impure sulphate of veratria obtained in the above process, nitric acid is to be introduced by drops. This occasions an abundant precipitate, from which the clear liquor is to be decanted. A weak solution of potassa is then to be added to the liquor, and the precipitate which it produces is to be washed with cold water, and treated with boiling alcohol. The substance obtained by evaporating the alcohol yields the *sabadillia* to boiling water, which deposites it upon cooling—a substance called by M. Couerbe *resini-gum of sabadillia*, remaining in solution. If the residue of the substance treated as just mentioned with boiling water, be submitted to the action of ether, it yields to this liquid the proper *veratria* which may be obtained entirely pure by the spontaneous evaporation of the ether. The matter remaining undissolved is the resinous substance which M. Couerbe calls *veratrin.*

Veratria, when pure, is white, pulverulent, uncrystallizable, inodorous, extremely acrid, fusible by heat, scarcely soluble in cold water, soluble in a thousand parts of boiling water which it renders sensibly acrid, dissolved freely by alcohol, less so by ether, and capable of neutralizing the acids, with several of which, particularly the sulphuric and muriatic, it forms crystallizable salts.

Sabadillia is white, crystallizable, insupportably acrid, fusible by heat, readily soluble in hot water which deposites it upon cooling, very soluble in alcohol, and wholly insoluble in ether. It is capable of saturating the acids.

For practical purposes it is unnecessary to obtain these two principles in a separate state; and the impure veratria obtained by the process above described as that of M. Couerbe, possesses, in all probability, more fully the properties of white hellebore, than the alkali entirely pure. (*Journ. de Pharm.* xix. 527.)

Medical Properties and Uses. White hellebore is a violent emetic and cathartic, capable of producing dangerous and fatal effects when incautiously administered. Even in small doses it has sometimes occasioned severe vomiting, hypercatharsis with bloody stools, and alarming symptoms of general prostration. Applied externally upon a portion of the surface denuded of the cuticle, as upon ulcers for example, it gives rise to griping pain in the bowels, and sometimes violent purging. When snuffed up the nostrils, it occasions great irritation with violent sneezing, and its use in this way is not free from danger. It was employed by the ancients in dropsy, mania, epilepsy, leprosy, elephantiasis, and other obstinate disorders, not without occasional advantage; but the severity of its operation has led to its general abandonment as an internal remedy. It is sometimes used as an errhine, diluted with some mild powder, in cases of gutta serena and lethargic affections; and in the shape of decoction, or of ointment prepared by mixing the pulverized root with lard, has been found beneficial as an external application in the itch, and in other cutaneous eruptions. From the resemblance of its operation to that of the *eau medicinale d'Husson*, so celebrated for the cure of gout, it has been conjectured to be the chief constituent of that remedy—a reputation which has also been enjoyed by colchicum; and the existence of *veratria* in the two medicines, accounts for this coincidence. A mixture of the wine of white hellebore and the wine of opium, in the proportion of three parts of the former to one of the latter, was introduced into use by Mr. Moor of London as a substitute for the eau medicinale, and has been considerably employed in gouty and rheumatic affections.

In whatever way white hellebore is used, it requires cautious management. It has been given in doses varying from one grain to a scruple. Not more than two grains should be administered at first. When employed as an errhine it should be mixed with five or six parts of pulverized liquorice root or other inactive powder. Ten or twelve grains of the mixture may be snuffed up the nostrils at one time.

Veratria acts in a similar manner with the white hellebore, but is much more powerful. One-twelfth of a grain may be given in the form of pill or alcoholic solution, and repeated three or four times in the twenty-four hours, till it purges. Dr. Turnbull of London very highly recommends veratria as an external application in functional disorders of the heart, neuralgia, rheumatism, and different forms of dropsy. He says that when rubbed upon the sound skin, in the form of ointment, to the extent of six or eight grains a day, it calms irritation, removes pain, and exhilarates the spirits, at the same time not unfrequently inducing constipation, and in cases of serous effusion, acting as a powerful diuretic. It occasions, when thus applied, no other local irritation than a slight blush upon the skin, and a sense of warmth and tingling in the part, which extends over the whole body, when the system comes under its influence. To the denuded cutis, it proves too irritating to admit of its application. He uses an ointment made with lard in the proportion of from fifteen to forty grains of veratria to the ounce, and directs a portion of this of the size of a nut to be rubbed upon the skin daily. (*Am. Journ. of the Med. Sci.* xiv. 440.)

Off. Prep. Decoctum Veratri, *Lond.*, *Dub.*; Tinctura Veratri Albi, *Ed.*; Unguentum Veratri Albi, *U. S.*, *Lond.*, *Dub.*; Unguentum Sulphuris Compositum, *Lond.*; Vinum Veratri Albi, *U.S.*, *Lond.* W.

VERATRUM VIRIDE. *U.S.*

American Hellebore.

"Veratrum viride. Radix. *The root.*" *U.S.*

Veratrum. See VERATRUM ALBUM.

Veratrum viride. Willd. *Sp. Plant.* iv. 896; Bigelow, *Am. Med. Bot.* ii. 121. The American hellebore, known also by the names of *Indian poke*, *poke root*, and *swamp hellebore*, has a perennial, thick, fleshy root, the upper portion of which is tunicated, the lower solid and beset with numerous whitish fibres or radicles. The stem is annual, round, striated, pubescent, and solid, from three to six feet in height, furnished with bright green leaves, and terminating in a panicle of greenish-yellow flowers. The leaves gradually decrease in size as they ascend. The lower are from six inches to a foot long, oval, acuminate, plaited, nerved, and pubescent; and embrace the stem at their base, thus affording it a sheath for a considerable portion of its length. Those on the upper part of the stem, at the origin of the flowering branches, are oblong lanceolate. The panicle consists of numerous flowers distributed in racemes with downy peduncles. Each flower is accompanied with a downy pointed bracte much longer than its pedicel. There is no calyx, and the corolla is divided into six oval acute segments, thickened on the inside at their base, with the three alternate segments longer than the others. The six stamens have recurved filaments, and roundish two-lobed anthers. The germs are three, with recurved styles as long as the stamens. Some of the flowers have only the rudiments of pistils. Those on the upper end of the branchlets are barren, those on the lower portion fruitful. The fruit consists of three cohering capsules, separating at top, opening on the inner side, and containing flat imbricated seeds.

This indigenous species of Veratrum is found from Canada to Carolina, inhabiting swamps, wet meadows, and the banks of mountain streamlets. Early in the spring, before the stem rises, it bears a slight resemblance to the *Symplocarpus fœtidus*, with which it is very frequently associated; but the latter sends forth no stem. From May to July is the season for flowering.

The root of the American hellebore has a bitter acrid taste, leaving a permanent impression in the mouth and fauces. Though not hitherto chemically analyzed, it probably contains *veratria*. In sensible properties and medical effect, it bears so close a resemblance to the white hellebore, that a separate description is unnecessary. It may be safely substituted for the European root, in all cases in which the latter is employed, may be given in the same dose, and administered in a similar manner. It is, however, very little used in regular practice. (See *Veratrum Album.*) For an account of what may be said upon the medical properties and applications of the American hellebore, the reader is referred to a paper by Dr. Charles Osgood, in the *American Journal of the Medical Sciences*, vol. xvi. p. 296. It is stated by Dr. Osgood that our native hellebore differs from the European in being totally destitute of any laxative property.

Off. Prep. Unguentum Veratri Viridis, *U.S.* W.

VERBASCUM THAPSUS. Folia. *Dub.*

Mullein Leaves.

VERBASCUM. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Solaneæ.

Gen. Ch. Calyx five-parted. *Corolla* rotate, five-lobed, unequal. *Stamens* declined, bearded. *Stigma* simple. *Capsule* two-celled, valves inflected, many-seeded. *Nuttall.*

Verbascum Thapsus. Willd. *Sp. Plant.* i. 1001; Woodv. *Med. Bot.* p. 202. t. 75. This is a biennial plant, with an erect, round, rigid, hairy stem, which rises from three to six feet in height, and is irregularly beset with large sessile, oblong or oval, somewhat pointed leaves, indented at the margin, woolly on both sides, and decurrent at the base. The flowers are yellow, and disposed in a long, close, cylindrical, terminal spike.

The mullein is common throughout the United States, growing along the road-sides and in neglected fields, and springing up abundantly in newly cleared places, at the most remote distance from cultivation. It is nevertheless considered by many botanists as a naturalized plant, introduced originally from Europe, where it is also abundant. It flowers from June to August. The leaves and flowers have been employed; but the former only are directed by the Dublin College. Both have a slight, somewhat narcotic smell, which in the dried flowers becomes agreeable. Their taste is mucilaginous, herbaceous, and bitterish, but very feeble. They impart their virtues to water by infusion.

Medical Properties and Uses. They are demulcent and emollient, and are thought to possess anodyne properties, which render them useful in pectoral complaints. On the Continent of Europe, an infusion of the flowers strained, in order to separate the rough hairs, is considerably used in mild catarrhs. Dr. Home found a decoction of the leaves useful in diarrhœa. The leaves are also employed externally, steeped in hot water, as a feebly anodyne emollient. An ointment is prepared from them in the recent state, and used for the same purposes. It may be made in the same manner as ointment of stramonium, by boiling the leaves in lard. It will be found advantageous to moisten them with water previously to the boiling. W.

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VERONICA. *U.S. Secondary.*

Veronica.

"Veronica Virginica. Radix. *The root. U.S.*

Several species of Veronica, common to Europe and this country, have been medicinally employed, under the impression that they possessed alterative and antiscorbutic properties. Among these are the *Veronica officinalis* or speedwell, and *V. Beccabunga* or brooklime, the latter of which has but recently been discharged from the officinal catalogue of the Dublin College. None of them are now employed. The *Veronica Virginica* of Linnæus, the root of which is the officinal Veronica, has been separated from this genus by Mr. Nuttall, and erected into a new one with the title of Leptandra, which is now generally acknowledged. The proper name, therefore, of the plant under consideration, is *Leptandra Virginica.*

Leptandra. *Sex. Syst.* Diandria Monogynia.—*Nat. Ord.* Scrophularineæ.

Gen. Ch. Calyx five parted, segments acuminate. *Corolla* tubular-campanulate, border four-lobed, a little ringent, unequal, the lower lamina narrower. *Stamens* and at length the *pistil* much exserted; filaments below, and tube of the corolla pubescent. *Capsule* ovate, acuminate, two-celled, many-seeded, opening at the summit. *Nuttall.*

Leptandra Virginica. Nuttall, *Gen. of N. Am. Plants*, i. 7; Rafinesque, *Med. Flor.* vol. ii. This plant, sometimes called *Culver's physic*, has a perennial root, with an herbaceous stem three or four feet high, furnished with leaves in whorls, and terminating in a long spike of white flowers. A variety was seen by Pursh with purple flowers. This is described and figured as a distinct species by Rafinesque, under the title of *L. purpurea.*

The plant grows throughout the United States, affecting particularly calcareous hills and sunny exposures, and flowering in August. The root, which is the part used, is bitter and nauseous, and yields its active properties to boiling water.

Medical Properties and Uses. When recent it is said to act violently as a cathartic, and sometimes as an emetic. In the dried state it is more uncertain. The dose of the powder is from twenty grains to a drachm. It is one of the medicines which will probably be omitted on a future revision of the Pharmacopœia.

W.

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VINUM. *U.S.*

Wine.

"Vinum album Teneriffe dictum. *The white wine called Teneriffe.*" *U.S.*

Off. Syn. VINUM ALBUM HISPANUM. Anglicè, *Sherry, Ed.;* VINUM ALBUM HISPANUM. *Dub.*

Vin, *Fr.;* Wein, *Germ.;* Vino, *Ital., Span.*

Wine is the fermented juice of the grape, the fruit of the Vitis vinifera of botanists, an important plant, the description of which will be found under another head. (See *Uva Passa.*) The juice of sweet grapes consists of a considerable quantity of sugar, a peculiar matter of the nature of ferment or yeast, and a small portion of mucilage, tannin, supertartrate of potassa, tartrate of lime, common salt, and sulphate of potassa; the whole dissolved or suspended in a large quantity of water. Sour grapes contain, in addition, a peculiar acid isomeric with the tartaric, called *paratartaric acid.* Grape juice, therefore, embraces all the ingredients essential to the production of the vinous fermentation, and requires only the influence of the atmosphere and a proper temperature to convert it into wine. The theory of the vinous fermentation, and the agency of sugar in the process, have been explained under *Alcohol.*

Preparation. Though the art of making wine varies in different countries, it is, nevertheless, regulated by general rules which require to be observed. When the grapes are ripe, they are gathered, and trodden under foot in wooden vessels with perforated bottoms, through which the juice, called the *must*, runs into a vat placed beneath. The temperature of the air being about 60°, the fermentation gradually takes place in the must, and becomes fully established after a longer or shorter period. In the mean time, the must becomes sensibly hotter, and emits a large quantity of carbonic acid, which, creating a kind of effervescence, causes the more solid parts to be thrown to the surface in a mass of froth having a hemispherical shape called the *head.*

The liquor, from being sweet, becomes vinous, and assumes a deep red colour if the product of red grapes. After a while the fermentation slackens, and it becomes necessary to accelerate it by thoroughly mixing the contents of the vat. When the liquor has acquired a strong vinous taste, and become perfectly clear, the wine is considered as made, and is racked off into casks. But even at this stage of the process, the fermentation is not completed, but continues for several months longer. During the whole of this period, a frothy matter is formed, which, for the first few days, collects round the bung, but afterwards precipitates along with colouring matter and tartar, forming a deposite which constitutes the wine-lees.

Division and Nomenclature. Wines, according to their colour, are divided into the red and white; and, according to their taste and other qualities, are either spirituous, sweet, dry, light, sparkling, still, rough, or acidulous. *Red wines* are derived from the must of black grapes, fermented with their husks; *white wines*, from white grapes, or from the juice of black grapes fermented apart from their skins. The other qualities of wines above enumerated, depend on the relative proportions of the constituents of the must, and on the mode in which the fermentation is conducted. The essential ingredients of the must as a fermentable liquid, are water, sugar, and a ferment. If the juice be very saccharine, and contain sufficient ferment to sustain the fermentation, the conversion of the sugar into alcohol will proceed until checked by the production of a certain amount of the latter, and there will be formed a *spirituous* or *generous* wine. If, while the juice is highly saccharine, the ferment be deficient in quantity, the production of alcohol will be less and the redundancy of sugar proportionably greater, and a *sweet wine* will be formed. When the sugar and ferment are in considerable amount, and in the proper relative proportions for mutual decomposition, the wine will be strong-bodied and sound, without any sweetness or acidity, and of the kind called *dry*. A small portion of sugar can give rise only to a small portion of alcohol, aud consequently the less saccharine grapes will generate a comparatively weak, or *light wine*, which will be sound and stable in its constitution, in case the ferment is not in excess, but otherwise liable to pass into the acetous fermentation and become acescent. In case the fermentation is checked, and the wine bottled before it is fully completed, the process will continue slowly in the bottles, and the carbonic acid generated, not having vent, will impregnate the wine, and render it effervescing and *sparkling* when drawn. The *rough* or astringent wines owe their flavour to a portion of tannin derived from the husks of the grape; and the *acidulous* wines, to the presence of carbonic acid or an unusual proportion of tartar. Several of the above qualities are often combined. Thus a wine may be spirituous and sweet, spirituous and rough, rough and sweet, light and sparkling, &c.

Wines are made in many countries, and are known in commerce by various names according to their source. Thus, *Portugal* produces port and lisbon; *Spain*, sherry, saint lucar, malaga, and tent; *France*, champaigne, burgundy, hermitage, vin de grave, sauterne, and claret; *Germany*, white rhenish, hock, and moselle; *Hungary*, tokay, *Sicily*, marsala or Sicily madeira, and lissa; the *Cape of Good Hope*, constantia; *Madeira and the Canaries*, madeira and teneriffe. In the United States, a small portion of wine is made, for the most part of inferior quality. The best is manufactured near Vevay, a Swiss settlement on the banks of the Ohio. The consumption of this country is accordingly supplied almost entrely from abroad; and the wines most extensively imported are madeira and teneriffe, sherry and port, and the claret wines of France.

Properties. Wine, considered as representing a class, may be characterized as a spirituous liquid, the result of the fermentation of grape-juice, and containing mucilage, aroma, and some other substances, which are either combined or intimately blended with the spirit. All its other qualities vary with the nature of each particular wine. It will not be necessary to describe all the wines which have been enumerated; but only such as are commonly used for medicinal purposes. Under this denomination may be included the officinal wines teneriffe and sherry, together with madeira, port, and claret.

Teneriffe, the officinal wine of the U.S. Pharmacopœia, is a white wine, of a slightly acid taste, and, when of good quality, of a fine aromatic flavour. It ranks among the stronger white wines, and contains between 19 and 20 per cent. by measure of alcohol of sp. gr. 0.825. It is made from the same grape as madeira, to which it bears a close resemblance.

Sherry is of a deep amber colour, and when good possesses a dry aromatic flavour and fragrancy, without any acidity. Its average strength is about the same as that of teneriffe. This is the officinal wine of the Edinburgh College, and is probably the "Spanish white wine" intended by the Dublin College. It is prepared in the vicinity of Xeres in Spain, and hence its English name, *sherry*. This wine is supposed to have been the *sack* of Shakspeare, so called from the word *sec* (dry), in allusion to its being a dry wine. Its dryness or freedom from acidity is said to arise from the use of lime in its manufacture.

Madeira is the strongest of the white wines in general use. Like teneriffe, it is a slightly acid wine, and when of proper age, and in good condition, has a nutty, rich, aromatic flavour. As it occurs in the market, however, it is of very variable quality, on account both of the less care taken in its manufacture than formerly, and of the adulterations and mixtures to which it is subjected after importation. Nevertheless, the madeira consumed in this country is generally much better than that used in England, its adulteration being practised to a less extent with us, and our climate being more favourable to the improvement of the wine.

Port is of a deep purple colour, and, in its new state, is a rough, strong, and slightly sweet wine. When kept a certain length of time in bottle, it deposites a considerable portion of its astringent matter, loses the greater part of its sweetness, acquires more flavour, and retains its strength. If too long kept, it deposites the whole of its astringent and colouring matter, and becomes deteriorated. Considerable quantities of brandy are almost always added to it, which causes its heating quality on the palate. It is the strongest of all the wines in common use.

Claret, called in France *vin de Bordeaux*, is also a red wine, and from its moderate strength is ranked as a light wine. It has a deep purple colour, and when good a delicate taste, in which the vinous flavour is blended with those of slight acidity and astringency. The most esteemed kinds are the Medoc clarets, called *Château Lafite*, *Château Margaux*, and *Château Latour*. Another celebrated variety is the *Château Haut Brion* of the Pays de Grave. Claret is the only French wine which is extensively consumed in the United States. It is made in large quantities in the country around Bordeaux, from which port it is shipped.

Adulterations. Wines are very frequently adulterated, and counterfeit mixtures are often palmed upon the public as genuine wine. Formerly the wine dealers were in the habit of putting litharge into wines that had become acescent. The oxide of lead formed with the acetic acid acetate of lead, which, being sweet, corrected the defect of the wine, but at the same time rendered it poisonous. At the present day, however, this criminal practice is wholly abandoned, on account of the facility with which the adulteration is detected by chemical reagents, particularly by sulphuretted hydrogen, which causes a black and flocculent precipitate. Mr. Brande assures us, that among the numerous samples of wine of suspected purity which he had examined, he had not found one containing any poisonous ingredient fraudulently introduced. Lead, in minute quantity, according to this writer, may often be detected in wines; but it is derived invariably from shot in the bottle, or some analogous source. Spurious mixtures, frequently containing very little of the fermented juice of the grape, which are sold for particular wines, may not be poisonous; but are notwithstanding highly pernicious in their effects upon the stomach; and always produce mischief and disappointment, when depended on as medicinal agents. The wines most frequently imitated are port and madeira; and cider is generally the chief ingredient in the spurious mixtures. *English port* is sometimes made of a small portion of real port mixed with cider, juice of elder berries, and brandy, and coloured and rendered astringent with logwood and alum. In the United States, of latter years, the cheapness of genuine wines has left little motive for manufacturing these factitious imitations.

Composition. Wine, throughout all its varieties, has the same general composition. It consists of a large quantity of water, a variable portion of alcohol, a little mucilage, tannin, a blue and yellow colouring matter, acetic acid, supertartrate of potassa (tartar), tartrate of lime, and occasionally other salts, such as common salt and sulphate of potassa. There is also present in wine a peculiar aroma, which is supposed by some to depend upon the presence of an oil, but which has never been isolated. The different kinds of wine derive their various flavours and qualities from this aroma, as well as from the mode of fermentation, the nature of the grape, and the soil and climate in which it may have grown. The alcohol in pure wine is that which results from the vinous fermentation, and is intimately united with the other ingredients of the liquor; but with almost all the wines of commerce a certain portion of brandy has been mixed, the state of union of which is different from that of the natural alcohol of the wine. This seems to be proved by the experiments of Fabroni, who found, upon adding a large portion of carbonate of potassa to wine containing extraneous brandy, that the latter was thrown up to the surface in the form of a stratum; whereas from a pure wine, a similar treatment had no effect in separating the natural alcohol which it contained.

The intoxicating ingredient in all wines is the alcohol which they contain; and hence their relative strength depends upon the quantity of this substance entering into their composition. The alcohol, however, naturally in wine, is so blended with its other constituents, as to be in a modified state, which renders it less intoxicating and less deleterious than the same quantity of alcohol separated by distillation and diluted with water. Mr. Brande has published a very interesting table, giving the percentage by measure of alcohol of sp. gr. 0.825 in different kinds of wine. The following abstract contains his principal results.

	Alcohol per cent.		*Alcohol per cent.*
Lissa, average	25.41	Port	25.83
Raisin wine, average	25.12	Ditto	24.29
Marsala, [Sicily madeira], average	25.09	Ditto	23.71
		Ditto	23.39

	Alcohol per cent.		*Alcohol per cent.*
Port	22.30	Vidonia	19.25
Ditto	21.40	Alba flora	17.26
Ditto	19.00	Malaga	17.26
Average	22.96	White hermitage	17.43
Madeira	24.42	Rousillon, average	18.13
Ditto	23.93	Claret	17.11
Ditto (Sercial)	21.40	Ditto	16.32
Ditto	19.24	Ditto	14.08
Average	22.27	Ditto	12.91
Sherry	19.81	Average	15.10
Ditto	19.83	Malmsey madeira	16.40
Ditto	18.79	Lunel	15.52
Ditto	18.25	Shiraz	15.52
Average	19.17	Syracuse	15.28
Teneriffe	19.79	Sauterne	14.22
Colares	19.75	Burgundy, average	14.57
Lachryma Christi	19.70	Hock, average	12.08
Constantia, white	19.75	Nice	14.63
Ditto, red	18.92	Barsac	13.86
Lisbon	18.94	Tent	13.30
Bucellas	18.49	Champagne, average	12.61
Red madeira, average	20.35	Red hermitage,	12.32
Cape Muschat	18.25	Vin de grave, average	13.37
Cape madeira, average	20.51	Frontignac,	12.79
Grape wine	18.11	Côte rotie	12.32
Calcavella, average	18.65	Tokay	9.88

Besides the grape, a number of other fruits yield a juice susceptible of the vinous fermentation. The infusion of malt, also, is capable of undergoing this process, and becomes converted into the different kinds of porter and ale. The product in all these cases, though not commonly called a wine, is nevertheless a vinous liquor, and may be classed among the wines properly so called. The following is a list of these vinous liquors, together with the percentage of alcohol which they contain, as ascertained by Mr. Brande.—Currant wine, 20.55; gooseberry wine, 11.84; orange wine, 11.26; elder wine, 8.79; cider, from 5.21 to 9.87; perry, 7.26; mead, 7.32; Burton ale, 8.88; Edinburgh ale, 6.20; brown stout, 6.80; London porter, 4.20; small beer, 1.28.

Medical Properties and Uses. Wine is consumed in most civilized countries as an article of frequent beverage; but in a state of health it is at least useless, if not absolutely pernicious. The degree of mischief which it produces, depends very much on the character of the wine. Thus the light wines of France are comparatively innocuous; while the habitual use of the stronger ones, such as port, madeira, sherry, &c., even though taken in moderation, is always injurious, as having a tendency to induce gout and apoplexy, and other diseases dependent on plethora and over-stimulation. All wines, however, when used habitually in excess, are productive of the worst consequences. They weaken the stomach, produce diseases of the liver, and give rise to dropsy, gout, apoplexy, tremors, and not unfrequently mania. Nevertheless, wine is an important medicine, productive of the best effects in certain diseases and states of the system. As an article of the materia medica, it ranks as a stimulant and antispasmodic. In the convalescence from protracted fever, and in sinking of the vital powers, it is frequently the best remedy that can be employed. In certain stages of typhoid fevers, and in extensive ulceration and gangrene, this remedy, either alone, or conjoined with bark or opium, is often our main dependence. In low febrile affections, if it increase the fulness and lessen the frequency of the pulse, mitigate delirium, and produce a tendency to sleep, its further use may be deemed proper; but on the contrary, if it render the pulse quicker, augment the heat and thirst, produce restlessness, or increase delirium, it should be immediately laid aside as injurious. In some convulsive diseases, as for example tetanus, wine, liberally given, has been found useful.

Wine, when used medicinally, ought always to be sound, and good of its kind; for otherwise it will disagree with the stomach, and prove rather detrimental than useful. The individual wine selected for internal exhibition must be determined by the nature of the disease, and the particular object in view. *Teneriffe* is a good variety of white wine for medicinal use, being of about a medium strength, and agreeing very well with most stomachs. *Sherry*, when in good condition, is also a fine wine, and, being free from all acid, is to be preferred whenever the stomach is delicate, or has a tendency to dyspeptic acidity. Unfortunately, however, it is of very unequal quality. Good *madeira* is the most generous of the white wines, particularly adapted to the purpose of resuscitating debilitated constitutions, and of sustaining the sinking energies of the system in old age. The slight acidity, however, of pure madeira, causes it to disagree with certain stomachs, and renders it an improper wine for gouty persons. *Port* is generally used in cases of pure debility, especially when attended with a loose state of the bowels unaccompanied by inflammation. In such cases, it often acts as a powerful tonic as well as stimulant, giving increased activity to all the functions, especially digestion. *Claret* is much less heating, and is often useful on account of its aperient and diuretic qualities.

All the acid and acidulous wines are contra-indicated in the gouty and uric acid diatheses, as they are very apt to convert the existing predisposition into disease. They are useful, however, in what is called the phosphatic diathesis, their acidity tending to prevent the deposition of the earthy phosphates.

The quantity of wine which may be given with advantage in disease, is necessarily very variable. In low fevers, it may be administered to the extent of a bottle or more in twenty-four hours, either pure, or in the form of *wine-whey*. This is made by adding from a gill to half a pint of wine to a pint of boiling milk, straining without pressure to separate the curd which is formed, and sweetening the clear whey with loaf sugar. Wine-whey forms a peculiarly safe and grateful stimulus in typhoid fevers and other febrile affections, which, after depletion, may tend to a state of deficient action and be accompanied with a dry skin. Under these circumstances, it often acts as a diaphoretic, and, if used of moderate strength, without stimulating the system in any marked degree.

Pharmaceutical Uses. Wine is employed as a menstruum to extract the virtues of several plants, and the preparations thus formed are called *vinous tinctures* or *medicated wines.* Tartar emetic and iron are the only mineral substances prepared in a similar manner. (See *Vinum Antimonii* and *Vinum Ferri.*) The London College has superseded the use of wine altogether as a pharmaceutical agent, on account of its variable quality, and substituted spirit of equivalent strength. It is on this account that wine has latterly been expunged from their officinal list. Nevertheless, they have a class of preparations called "Vina," which name, by a solecism in language, is applied to medicines prepared with proof spirit and water, without the use of a particle of wine. For the peculiar powers of wine as a menstruum for medicinal substances, see *Vina Medicata.* B.

VIOLA. *U.S. Secondary.*

Violet.

"Viola pedata. Planta. *The Plant.*" *U.S.*

VIOLÆ ODORATÆ FLORES. *Ed.*

Flowers of the Sweet Violet.

Off. Syn. VIOLA ODORATA. Flores. *Dub.*

Violette odorante, *Fr.;* Wohlriechendes Veilchen, *Germ.;* Violetta, *Ital.;* Violeta, *Span.*

VIOLA. *Sex. Syst.* Pentandria Monogynia.—*Nat. Ord.* Violaceæ.

Gen. Ch. Calyx five-leaved. *Corolla* five-petaled, irregular, horned at the back. *Anthers* cohering. *Capsule* superior, three-valved, one-celled.

This genus includes numerous species, of which, though perhaps all or nearly all are possessed of analogous properties, two only are recognised as officinal, the *V. odorata,* by the Edinburgh and Dublin Colleges, and the *V. pedata,* by our National Pharmacopœia. The *V. ovata,* an indigenous species, has been recommended as a remedy for the bite of the rattlesnake. (See a paper by Dr. Williams in the *Am. Journ. of the Med. Scien.* xiii. 310.)

Viola odorata. Willd. *Sp. Plant,* i. 1163; Woodv. *Med. Bot,* p. 251. t. 89. This is a small, pretty, creeping plant, the runners of which are furnished with fibrous roots, and send up annually tufts of leaves and flowers. The leaves are heart-shaped, crenate, and supported on long petioles. The flowers are at the summit of delicate, quadrangular, channeled, radical peduncles. The leaves of the calyx are shorter than the petals, which are obovate, obtuse, unequal, and of a bluish-purple or deep violet colour, except at the claws which are whitish. The two lateral petals are spreading and bearded towards the base, the inferior furnished with a large spur, and the two upper reflected. In the centre are the stamens with very short filaments, and anthers slightly cohering by an orange-coloured membranous expansion.

The sweet violet is a native of Europe, growing in woods, hedges, and other shady places. It is cultivated in gardens both for its beauty and for medical use; and has been introduced into this country. It is valued chiefly for its flowers, which appear in April and May.

The flowers of this species of violet, besides their beautiful colour, have a peculiar agreeable odour, and a very slightly bitter taste. These properties they yield to boiling water; and their infusion affords a very delicate test for acids and alkalies, being reddened by the former, and rendered green by the latter. Their odour is destroyed by desiccation; and the degree to which they retain their fine colour, depends upon the care used in collecting and drying them. They should be gathered before being fully blown, deprived of their calyx, and rapidly dried, either in a heated room, or by exposing them to a current of very dry air. The flowers of other species are often mingled with them, and, if of the same colour, are equally useful as a chemical test.

In the roots, leaves, flowers, and seeds of the *V. odorata*, M. Boulay has discovered a peculiar alkaline principle, bearing some resemblance to *emetia*, but possessing distinct properties. He calls it *violine;* but *violia* is its proper title in accordance with the nomenclature adopted in this work. It is white, soluble in alcohol, scarcely soluble in water, and forms salts with the acids. It exists in the plant combined with malic acid, and may be obtained by treating with distilled water the alcoholic extract of the dried root, decomposing by means of magnesia the malate of violia contained in the solution, and extracting the alkali from the precipitated matters by alcohol, which yields it on evaporation. To obtain it entirely pure, a more complicated process is necessary. Orfila has ascertained that it is exceedingly active and even poisonous. It is probably contained in most other species of Viola.

Viola pedata. Willd. *Sp. Plant.* i. 1160. Curtis, *Bot. Mag.* 89. This is an indigenous species, without stems, glabrous, with many-parted often pedate leaves, the segments of which are linear lanceolate, obtuse, and nearly entire. The flowers are large and of a beautiful blue colour. The divisions of the calyx are linear and acute. The stigma is large, compressed at the sides, obliquely truncate and perforate at the apex. The plant grows in dry sandy hills and fields, and rocky woods, from New England to Carolina; and flowers in May and June.

Medical Properties &c. of the Violets. The herbaceous parts of different species of violet are mucilaginous, emollient, and slightly laxative; and have been used in pectoral, nephritic, and cutaneous affections. Much was formerly thought of the *Viola tricolor* or pansy, as a remedy in the crusta lactea. A decoction in milk of a handful of the fresh, or half a drachm of the dried herb was taken morning and evening, and a poultice made with the same decoction was applied to the affected part. Cures in numerous instances are said to have been effected by this treatment persevered in for some time. Our own *Viola pedata* is considered a useful expectorant and demulcent in pectoral complaints. (*Bigelow.*)

In Europe, a syrup prepared from the fresh flowers of the *Viola odorata* is much employed as an addition to demulcent drinks, and as a laxative for infants. (See *Syrupus Violæ.*) The seeds were formerly considered useful in gravel; but are not now employed. The root, which has a bitter nauseous, slightly acrid taste, acts in the dose of thirty grains or a drachm as an emetic and cathartic. It is probable that the same property is possessed by the roots of all the violets, as it is known to be by several species of Ionidium, which belong to the same natural family. The existence in small proportion of the emetic principle, upon which the powers of the root probably depend, in the leaves and flowers, accounts for the expectorant properties long attributed to these parts of the plant. W.

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WINTERA. *U.S. Secondary.*

Winter's Bark.

"Drymis Winteri. *De Candolle.* Wintera aromatica. *Willd.* Cortex. *The bark.*" *U. S.*

Off. Syn. WINTERÆ AROMATICÆ CORTEX. *Ed.;* WINTERA AROMATICA. DRYMIS AROMATICA. Cortex. *Dub.*

Ecorce de Winter, *Fr.;* Wintersche Rinde, *Germ.;* Corteccia Vinterana, *Ital.;* Corteza Winterana, *Span.*

Drymis. *Sex. Syst.* Polyandria Tetragynia.—*Nat. Ord.* Magnoliaceæ, *Juss.;* Wintereæ, *R. Brown, Lindley.*

Gen. Ch. *Calyx* with two or three deep divisions. *Corolla* with two or three petals, sometimes more numerous. *Stamens* with the filaments thickened at the summit, and anthers having two separated cells. *Ovaries* from four to eight, changing into the same number of small, many-seeded berries. *A. Richard.*

Drymis Winteri. De Cand. *Prod.* ii. 78; Foster, *Gen.* p. 84. t. 42.—*Wintera aromatica.* Willd. *Sp. Plant.* ii. 1239; Woodv. *Med. Bot.* p. 647. t. 226. This is an evergreen tree, varying very much in size, sometimes rising forty or fifty feet in height, sometimes not more than six or eight feet. The bark of the trunk is gray, that of the branches green and smooth. Its leaves are alternate, petiolate, oblong, obtuse, somewhat coriaceous, entirely smooth, green on their upper surface, of a pale bluish colour beneath, with two caducous stipules at their base. The flowers are small, sometimes solitary, but more frequently in clusters of three or four, upon the summit of a common peduncle about an inch in length, simple, or divided into as many pedicels as there are flowers. The tree is a native of the southern part of South America, growing along the Straits of Magellan, and extending as far north as Chili. According to Martius it is found also in Brazil. The bark of the tree was brought to England, in the latter part of the sixteenth century, by Captain Winter, who attended Drake in his voyage round the world, and while in the Straits had learned its aromatic and medicinal properties. Since that period it has been occasionally employed in medicine.

It is in quilled pieces, usually a foot in length, and an inch or more in diameter, appearing as if scraped or rubbed on the outside, where the colour is pale yellowish or reddish-gray, with red elliptical spots. On the inside the colour is that of cinnamon, though sometimes blackish. The pieces are sometimes flat and very large. The bark is two or three lines in thickness, hard and compact, and when broken exhibits on the exterior part of the fracture a grayish colour, which insensibly passes into reddish or yellowish towards the interior. The powder resembles in colour that of Peruvian bark. The odour is aromatic, the taste spicy, pungent, and even burning.

Winter's bark was found by M. Henry to contain resin, volatile oil, colouring matter, tannin, several salts of potassa, malate of lime, and oxide of iron. The presence of tannin and oxide of iron serves to distinguish it essentially from the *canella alba*, with which it is often confounded.

Medical Properties and Uses. It is a stimulant aromatic tonic, and was employed by Winter as a remedy for the scurvy. It may be used for similar purposes with cinnamon or canella alba, but is scarcely known in the medical practice of this country. The dose of the powder is about half a drachm. W.

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XANTHORHIZA. *U. S. Secondary.*

Yellow-root.

"Xanthorhiza apiifolia. Radix. *The root.*" *U.S.*

Xanthorhiza. *Sex. Syst.* Pentandria Polygynia.—*Nat. Ord.* Ranunculaceæ.

Gen. Ch. *Calyx* none. *Petals* five. *Nectaries* five, pedicelled. *Capsules* five to eight, one-seeded, semibivalve. *Nuttall.*

Xanthorhiza apiifolia. Willd. *Sp. Plant.* i. 1568; Barton, *Med. Bot.* ii. 203.—*X. tinctoria.* Woodhouse, *N. Y. Med. Repos.* vol. v. This is an indigenous shrub, two or three feet in height, with a horizontal root, which sends off numerous suckers. The stem is simple, rather thicker than a goose-quill, with a smooth bark, and bright yellow wood. The leaves, which stand thickly at the upper part of the stem, are compound, consisting of several ovate lanceolate, acute, doubly serrate leaflets, sessile upon a long petiole, which embraces the stem at its base. The flowers are small, purple, and disposed in long, drooping, divided racemes, placed immediately below the first leaves. The nectaries are obovate and bilobed, the styles usually about six or eight in number.

The yellow-root grows in the interior of the Southern and in the Western States. Nuttall says that it is abundant on the banks of the Ohio. It flowers in April. The root is the part directed by the Pharmacopœia; but the bark of the stem possesses the same virtues.

The root is from three inches to a foot in length, about half an inch in thickness, of a yellow colour, and of a simple but extremely bitter taste. It imparts its colour and taste to water. The infusion is not affected by a solution of the sulphate of iron. By the late Professor Barton the bark of the root was considered more bitter than its ligneous portion.

Medical Properties and Uses. Xanthorhiza possesses properties closely analogous to those of columbo, quassia, and the other simple tonic bitters; and may be used for the same purposes, and in the same manner. Dr. Woodhouse employed it in the dose of two scruples, and found it to lie easily upon the stomach. W.

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XANTHOXYLUM. *U. S. Secondary.*

Prickly Ash.

"Xanthoxylum fraxineum. Cortex. *The bark.*" *U. S.*

XANTHOXYLUM. *Sex. Syst.* Diœcia Pentandria.—*Nat. Ord.* Terebintaceæ, *Juss.;* Xanthoxyleæ, *Nees and Martius, Lindley.*

Gen. Ch. MALE. *Calyx* five-parted. *Corolla* none. FEMALE. *Calyx* five-parted. *Corolla* none. *Pistils* five. *Capsules* five, one-seeded. *Willd.*

Xanthoxylum fraxineum. Willd. *Sp. Plant.* iv. 757; Bigelow, *Am. Med. Bot.* iii. 156. The prickly ash is a shrub from five to ten feet in height, with alternate branches, which are covered with strong, sharp, scattered prickles. The leaves are alternate and pinnate, consisting of four or five pairs of leaflets, and an odd terminal one, with a common footstalk, which is sometimes prickly on the back, and sometimes unarmed. The leaflets are nearly sessile, ovate, acute, slightly serrate, and somewhat downy on their under surface. The flowers, which are small and greenish, are disposed in sessile umbels near the origin of the young shoots. The plant is polygamous, some shrubs bearing both male and perfect flowers, others only female. The number of stamens is five, of the pistils three or four in the perfect flowers, about five in the pistillate. Each fruitful flower is followed by as many capsules as it had germs. These capsules are stipitate, oval, punctate, of a greenish-red colour, with two valves, and one oval blackish seed.

This species of Xanthoxylum is indigenous, growing in woods and in moist shady places, throughout the Northern, Middle, and Western States. The flowers appear in April and May, before the foliage. The leaves and capsules have an aromatic odour recalling that of the oil of lemons. The bark is the officinal portion.

This, as found in the shops, is in pieces more or less quilled, from one to two lines in thickness, of a whitish colour, internally somewhat shining, with an ash-coloured epidermis, which in some specimens is partially or wholly removed, and in those derived from the small branches is armed with strong prickles. The bark is very light, brittle, of a farinaceous fracture, nearly or quite inodorous, and of a taste which is at first sweetish and slightly aromatic, then bitterish, and ultimately acrid. The acrimony is imparted to boiling water and alcohol, which extract the virtues of the bark. Its constituents, according to Dr. Staples, besides fibrous substance, are volatile oil, a greenish fixed oil, resin, gum, colouring matter, and a peculiar crystallizable principle which he calls *xanthoxylin*, but of which the properties are not designated. (*Journ. of the Phil. Col. of Pharm.* i. 165.)

Dr. Bigelow informs us, that the *Aralia spinosa*, or angelica tree, which grows in the Southern States, is occasionally confounded with the *X. fraxineum*, in consequence, partly, of being sometimes called like the latter *prickly ash*. Its bark, however, in appearance and flavour, is entirely different from the xanthoxylum.

Medical Properties and Uses. Xanthoxylum is stimulant, producing when swallowed a sense of heat in the stomach, with more or less general arterial excitement, and a tendency to diaphoresis. It is thought to resemble mezereon and guaiac in its remedial action, and is given in the same complaints. As a remedy in chronic rheumatism, it enjoys considerable reputation in this country. The dose of the powder is from ten grains to half a drachm, to be repeated three or four times a day. A decoction prepared by boiling an ounce in three pints of water down to a quart, may be given in the quantity of a pint, in divided doses, during the twenty-four hours.

The powder has sometimes been employed as a topical irritant, and the bark is a popular remedy for toothach. W.

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ZINCUM. *U.S., Lond., Ed., Dub.*

Zinc.

Speltre; Zinc, *Fr.;* Zink, *Germ.;* Zinco, *Ital., Span.*

Zinc occurs native in two principal states; as a sulphuret, called *blende*, and as a carbonate or silicate, denominated *calamine*. It is found in various parts of the world, but most abundantly in England and Germany, from which latter country the United States are principally supplied. The metal is extracted generally from calamine. This is roasted and mixed with charcoal powder, and the mixture heated in iron cylinders placed horizontally over a furnace. When the reduction of the zinc commences, iron receivers are adapted to the opening of the cylinder to receive the volatilized metal as it condenses. The metal is then melted and run into moulds, and forms *speltre*, or the zinc of commerce. In this state it is not pure, as it contains iron, lead, arsenic, copper, and charcoal. To purify it from these substances, it must be subjected to a second distillation in a crucible, furnished with a tube passing through its bottom and open at both ends; its upper extremity reaching a little more than half way up the interior of the crucible, and its lower end terminating above a vessel of water. The impure zinc being placed in the crucible, the cover luted on, and the fire applied, the pure zinc is volatilized, and passing down the tube by a descending distillation, condenses in the water below.

Properties. Zinc has a bluish-white colour, a peculiar taste, and a perceptible smell when rubbed. Its texture is laminated and its fracture crystalline. Its malleability and ductility are not very great. When perfectly pure, it may be reduced to thin leaves at ordinary temperatures; but the zinc of commerce requires to be heated to about 300° to render it laminable, at which temperature it may be conveniently reduced to the form of sheets, when it is applicable to many important uses in the arts. The softness of zinc is peculiar, as is shown by the circumstance that it clogs the file when the attempt is made to reduce it to filings; and hence if it be desired to have it in the divided form, it is necessary to submit it to fusion, and to triturate it at the moment of solidification. Its sp. gr. is about 7.1, and its equivalent number 32.3. Subjected to heat, it fuses at 773°. (*Daniell.*) At full redness it boils, and in close vessels may be distilled over; but in open ones it takes fire, and burns with a dazzling white flame, giving off dense white fumes. It dissolves in most of the acids with disengagement of hydrogen, and precipitates all the metals either in the metallic state or in that of oxide. It forms but one well characterized oxide, and but one sulphuret. The oxide is officinal, both in its pure and impure state, and will be described under other heads. See *Zinci Oxidum, U. S.*, and *Oxidum Zinci Impurum, Ed.*

Zinc is extensively employed in the arts. It is the best metal that can be used, in conjunction with copper, for galvanic combinations. Combined with tin and mercury, it forms the amalgam for electrical machines. Its solution in dilute sulphuric acid furnishes the readiest method for obtaining hydrogen. With copper it forms the useful alloy called brass, and in the form of sheet zinc it is sometimes employed to cover the roofs of houses. It should never be used for culinary vessels, as it is soluble in the weakest acids.

Pharmaceutical Uses. Zinc is never used in medicine in the metallic state; but in combination, it forms a number of important medicinal preparations, a list of which, with the synonymes, is subjoined.

Zinc is employed medicinally,—

I. OXIDIZED.

- Oxidum Zinci Impurum, *Ed.;* Anglicè, *Tutty.*
  - Oxidum Zinci Impurum Præparatum, *Ed.*
    - Unguentum Oxidi Zinci Impuri, *Ed.*
- Zinci Oxidum, *U.S.;* Zinci Oxydum, *Lond.*, *Dub.;* Oxidum Zinci, *Ed.*
  - Unguentum Zinci Oxidi, *U.S.;* Unguentum Zinci, *Lond.;* Unguentum Oxidi Zinci, *Ed.*; Unguentum Zinci Oxydi, *Dub.*

II. OXIDIZED AND COMBINED WITH ACIDS.

- Zinci Acetas, *U.S.*
  - Solutio Acetatis Zinci, *Ed.*
  - Zinci Acetatis Tinctura, *Dub.*
- Zinci Carbonas, *U.S.;* Calamina, *Lond.;* Carbonas Zinci Impurus, *Ed.;* Zinci Carbonas Impurum, Calamina, *Dub.;* Anglicè, *Calamine.*

Zinci Carbonas Præparatus, *U.S.;* Calamina Præparata, *Lond.;* Carbonas Zinci Impurus Præparatus, *Ed.;* Zinci Carbonas Impurum Præparatum, *Dub.*
Ceratum Zinci Carbonatis, *U.S.;* Ceratum Calaminæ, *Lond.;* Ceratum Carbonatis Zinci Impuri, *Ed.;* Unguentum Calaminæ, *Dub.;* Anglicè, *Turner's cerate.*
Zinci Sulphas, *U.S.*, *Lond.*, *Dub.;* Sulphas Zinci, *Ed.*
Solutio Sulphatis Zinci, *Ed.*
Liquor Aluminis Compositus, *Lond.* B.

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ZINCI CARBONAS. *U.S.*

Carbonate of Zinc.

Off. Syn. CALAMINA. *Lond.;* CARBONAS ZINCI IMPURUS. *Ed.;* ZINCI CARBONAS IMPURUM. CALAMINA. *Dub.*

Calamine; Lapis calaminaris, *Lat.;* Carbonate de zinc, Calamine, *Fr.;* Galmei, *Germ.;* Pietra calaminare, *Ital.;* Calamina, *Span.*

The term *calamine* is applied by mineralogists indiscriminately to two minerals, scarcely distinguishable by their external characters, the *carbonate* nd *silicate* of zinc. The term, however in the pharmaceutical sense, refers o the native *carbonate* only.

Properties, &c. Carbonate of zinc is found in various localities. It occurs n Carinthia, Hungary, and other parts of the continent of Europe, and is articularly abundant in England. It has been found also in the United States. It usually occurs in compact or earthy masses, or concretions, of a ull appearance, readily scratched by the knife, and breaking with an earthy racture; but sometimes it is found crystallized. Its colour is very variable; eing, in different specimens, grayish, grayish-yellow, reddish-yellow, and hen impure, brown, or brownish-yellow. Its sp. gr. varies from 3.4 to 4.4. efore the blow-pipe, it does not melt, but becomes yellow and sublimes. It s distinguished from the other variety of calamine (silicate) by dissolving in arm nitric acid without gelatinizing, and by not being rendered electric by eat. In composition, it is essentially a carbonate of zinc; this being associated with more or less of foreign impurities. The crystallized variety is nhydrous, and consists of one equiv. of carbonic acid 22.12, and one of oxide f zinc 40.3=62.42. The compact and earthy varieties are said to contain ne equiv. of water.

Pharmaceutical Uses. Calamine is usually calcined before it is received n the shops, in order to render it more easily pulverizable. It requires to e brought to a state of impalpable powder before it can be used in medicine, nd in this state it forms the *Prepared Carbonate of Zinc*, under which head ts medical properties will be noticed.

Off. Prep. Zinci Carbonas Præparatus, *U.S.*, *Lond.*, *Ed.*, *Dub.* B.

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OXIDUM ZINCI IMPURUM. *Ed.*

Impure Oxide of Zinc.

Tutty, Cadmia; Tutia, *Lat.;* Tuthie, Cadmie des fourneaux, *Fr.;* Tutia, *Germ.;* Tuzia, *al.;* Tucia, *Span.*

This oxide is officinal only in the Edinburgh Pharmacopœia. It is formed during the smelting of lead ores containing zinc. The oxide is deposited in the form of incrustations in the chimneys of the furnaces, from which it is detached and thrown into commerce.

Tutty is in the form of moderately hard and ponderous pieces, studded over with small protuberances, of a brownish colour on the outside, and yellowish within. Some pieces occasionally present a bluish cast, from the presence of small particles of metallic zinc. Sometimes a spurious article is sold for tutty, consisting of a mixture of blue clay and copper filings, made into a paste with water, and dried on an iron rod. It is distinguished from the genuine substance by its diffusing in water and exhaling an earthy smell, and by its greater friability.

Pharmaceutical Uses. Tutty is not used in medicine in the state here described, but requires to be levigated, when it becomes the *Oxidum Zinci Impurum Præparatum* of the Edinburgh College, under which head its medical properties will be mentioned.

Off. Prep. Oxidum Zinci Impurum Præparatum, *Ed.* B.

ZINGIBER. *U.S.*

Ginger.

"Zingiber officinale. Radix. *The root.*" *U.S.*

Off. Syn. ZINGIBERIS RADIX. Zingiber officinale. Radix. *Lond.;* AMOMI ZINGIBERIS RADIX. *Ed.;* ZINGIBER. AMOMUM ZINGIBER. Radix. *Dub.*

Gingembre, *Fr.;* Ingwer, *Germ.;* Zenzero, *Ital.;* Gengibre, *Span.*

ZINGIBER. *Sex. Syst.* Monandria Monogynia.—*Nat. Ord.* Scitamineæ.

Gen. Ch. Flowers spathaceous. Inner limb of the *corolla* with one lip. *Anther* double, with a simple recurved horn at the end. *Germen* inferior. *Style* enclosed in the furrow formed by the anther. *Loudon's Encyc. of Plants.*

This genus was separated by Mr. Roscoe from the *Amomum*, and is recognised by the United States and London Pharmacopœias; though the Edinburgh and Dublin Colleges adhere to the former arrangement, and still denominate the plant which yields ginger, *Amomum Zingiber.*

Zingiber officinale. Roscoe, *Trans. Linn. Soc.* viii. 348; *Amomum Zingiber.* Willd. *Sp. Plant.* i. 6; Woodv. *Med. Bot.* p. 731. t. 250. The ginger plant has a perennial, creeping, tuberous root, and an annual stem, which rises two or three feet in height, is solid, round, erect, and enclosed in an imbricated membranous sheathing. The leaves are lanceolate, acute, smooth, five or six inches long by about an inch in breadth, and stand alternately on the sheaths of the stem. The scape or flower stalk rises by the side of the stem from six inches to a foot high, like it is clothed with oval acuminate sheaths, but is without leaves, and terminates in an oval, obtuse, bracteal, imbricated spike. The flowers are of a dingy yellow colour, and appear two or three at a time between the bracteal scales.

The plant is a native of Hindostan, and is cultivated in all parts of India. It is also cultivated in the West Indies, whither it was transplanted from the East. The flowers have an aromatic smell, and the stems, when bruised, are slightly fragrant; but the root is the portion in which the virtues of the plant reside. This is fit to be dug up when a year old. In the West Indies, the ginger crop is gathered in January and February after the stems have withered. After having been properly cleansed, the root is scalded in boiling water, in order to prevent germination, and is then rapidly dried. Thus prepared, it constitutes the ordinary ginger of commerce, or *black ginger*, as it is sometimes called, from the darkish colour which it acquires in the process. It is imported into this country almost exclusively from Calcutta, and is known to the druggists by the name of East India ginger. In Jamaica another variety is prepared by selecting the best roots, depriving them of their epidermis, and drying them separately and carefully in the sun. This is called in the books *white ginger*, and is most highly valued. It reaches us from England, where it is said to undergo some further preparation, by which its appearance is improved. It is usually called in our markets *Jamaica ginger*. The root is also brought immediately from the West Indies in a recent state and sold by the confectioners. A preserve is made from ginger by selecting the roots while young and tender, depriving them of their cortical covering, and boiling them in syrup. This is occasionally imported from the East and West Indies. When good it is translucent and tender.

The *recent root* is an inch or more in length, somewhat flattened on its upper and under surface, knotty, obtusely and irregularly branched or lobed, externally of a light ash colour, and marked with circular rugæ, internally fleshy, and yellowish-white. It sometimes germinates when kept in the shops.

The *common*, *East India*, or *black ginger*, is of the same general shape, but has a dark ash-coloured wrinkled epidermis, which being removed in some places, exhibits patches of an almost black colour, apparently the result of exposure. Beneath the epidermis is a brownish, resinous, almost horny cortical portion. The interior parenchyma is whitish and somewhat farinaceous. The powder is of a light yellowish-brown colour. This variety is most extensively used throughout the country.

The *Jamaica* or *white ginger* differs in being entirely deprived of epidermis, and white or yellowish-white on the outside. The pieces are rounder, and thinner, in consequence of the loss of substance in their preparation. They afford when pulverized a beautiful yellowish-white powder, which is brought from Liverpool in jars. This variety is firm and resinous, and has more of the sensible qualities of ginger than the black.

General Properties. The odour of ginger is aromatic and penetrating, the taste spicy, pungent, hot, and biting. These properties gradually diminish, and ultimately disappear when the root is long exposed. The virtues of ginger are extracted by water and alcohol. Its constituents, according to M. Morin, are volatile oil of a greenish-blue colour; a resinous matter, soft, acrid, aromatic, and soluble in ether and alcohol; a sub-resin insoluble in ether; a little osmazome; gum; starch; a vegeto-animal matter; sulphur; acetic acid; acetate of potassa; and lignin. The peculiar flavour of the root appears to depend on the essential oil, its pungency partly on the resinous or resino-extractive principle. A considerable quantity of very pure white starch may be obtained from it.

Those pieces of ginger which are very fibrous, light and friable, or worm-eaten, should be rejected.

Medical Properties and Uses. Ginger is a grateful stimulant and carminative, and is often given in dyspepsia, flatulent colic, and the feeble state of the alimentary canal attendant upon atonic gout. It is an excellent addition to bitter infusions and tonic powders, imparting to them an agreeable, warming, and cordial operation upon the stomach. When chewed it produces much irritation of the mouth, and a copious flow of saliva; and when snuffed up the nostrils, in the state of powder, excites violent sneezing. It is sometimes used as a local remedy in relaxation of the uvula, and paralysis of the tongue and fauces. Externally applied, it acts as a rubefacient. It may be given in powder or infusion. The dose of the former is from ten grains to a scruple or more. The infusion may be prepared by adding half an ounce of the powdered or bruised root to a pint of boiling water, and may be given in the dose of one or two fluidounces.

Off. Prep. Acidum Sulphuricum Aromaticum, *U.S.*, *Ed.*, *Dub.;* Confectio Opii, *Lond.*, *Dub.;* Confectio Scammonii, *U.S.*, *Lond.*, *Dub.;* Infusum Sennæ Compositum, *Lond.*, *Dub.;* Pilulæ Cambogiæ Compositæ, *Lond.*, *Dub.;* Pilulæ Scillæ Compositæ, *Lond.*, *Dub.;* Pulvis Aromaticus, *U.S.*, *Ed.*, *Dub.;* Pulvis Cinnamomi Compositus, *Lond.;* Pulvis Scammonii Compositus, *Lond.*, *Dub.;* Pulvis Sennæ Compositus, *Lond.;* Syrupus Rhamni, *Lond.;* Syrupus Zingiberis, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Tinctura Cinnamomi Composita, *U.S.*, *Lond.;* Tinctura Zingiberis, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Vinum Aloes, *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

PART II.

PREPARATIONS.

THE preparation of medicines, which constitutes the art of Pharmacy, comes within the peculiar province of the apothecary. It is for his guidance that the various formulæ of the Pharmacopœia have been arranged, and to him that their directions are especially addressed.

A few general observations, therefore, of an explanatory nature, calculated to facilitate the progress of the pharmaceutic student, will not be misplaced under the present head. The business of the apothecary is to obtain a supply of good medicines, to preserve them with care, to prepare them properly for use, and to dispense them. Our remarks will embrace each of these points.

The substances obtained from the mineral and animal kingdoms, and those furnished by the chemical manufacturer, are of a nature to admit of no general precepts as to their proper condition, which would not be suggested by the common sense of the purchaser. He must receive them as offered, and judge of their fitness for his purposes by his knowledge of the peculiar properties of each. The same remark applies to vegetable substances from abroad; but with respect to indigenous plants, the apothecary is frequently called upon to exercise his judgment in relation to their collection and desiccation, and will derive advantage from some brief practical rules upon the subject.

Collecting and Drying of Plants. The proper mode of proceeding varies according to the nature of the part used. *Annual and biennial roots* are to be collected in the autumn, and *perennial roots* in the spring, before vegetation has commenced. They should be washed, and the small fibres, unless they are the part employed, should be separated from the fleshy solid part, which is to be cut in slices previously to being dried. *Bulbs* are to be gathered after the new bulb is perfected, and before it has begun to vegetate, which is at the time the leaves decay. *Barks*, whether of the root, trunk, or branches, should be gathered in the autumn or early in the spring. The dead epidermis, and the decayed parts, are to be separated. Of some trees, as the slippery elm, it is the inner bark only that is preserved. *Leaves* are to be gathered after their full development, before the fading of the flower. The leaves of biennial plants do not attain their perfect qualities until the second year. *Flowers* should in general be gathered at the time of their expansion, before or immediately after they have fully opened; and some, as the Rosa Gallica, while in the bud. *Aromatic herbs* are to be gathered when in flower. Leaves, flowers, and herbs, are to be gathered in clear dry weather, in the morning, after the dew is exhaled. *Stalks and twigs* are collected in autumn; *seeds* at the period of their full maturity.

Vegetables should be dried as rapidly as is consistent with their perfect preservation. *Fibrous roots* may be dried in the sun or in a room in which a heat of from 65° to 80° is maintained. *Fleshy roots* may be cut in transverse slices, dried in the open air till the moisture is nearly evaporated, and then placed in a stove heat not exceeding 100°, till perfectly dry and hard.

Bulbs must have the outer membranes peeled off, and be cut in transverse slices and dried in a heat not exceeding 100°. *Barks, woods*, and *twigs*, readily dry in thin layers in the open air. *Leaves* which are dry and thin do not require a heat exceeding 60° or 70°; those which are succulent may be exposed, by carefully and slowly raising the heat, to a temperature of 100°. *Flowers* must be dried carefully and rapidly in the shade; those of the most delicate texture and odour requiring the greatest care.

The following table, taken from the Edinburgh Dispensatory, presents the amount yielded by 1000 parts of the vegetables respectively mentioned, after being dried.

Roots of	Angelica Archangelica	263
	Aspidium Filix Mas	500
	Inula Helenium -	187
	Valeriana sylvestris	316
Bark of the	Oak - -	410
	Elder - -	292
	Elm - -	375
Twigs of	Solanum Dulcamara	308
Leaves of	Atropa Belladonna	140
	Conium maculatum	185
	Datura Stramonium	110
Leaves of	Digitalis purpurea	180
	Hyoscyamus niger	135
	Melissa officinalis	220
	Salvia officinalis	220
Tops of	Mentha piperita	215
Flowers of	Anthemis nobilis	338
	Borago officinalis	96
	Lavandula vera -	510
	Sambucus Ebulus	250
Petals of	Papaver Rhœas	84
	Rosa rubra -	330

Preservation of Medicines. The proper preservation of medicines is an art of the greatest importance to the apothecary. The aromatic gums and resins, and in general all the parts of vegetables, should be kept secluded from the light, and as much as possible from the air, in perfectly dry rooms. Boxes or barrels, with close covers, will serve for *roots* and *barks. Roots* which are to be preserved fresh should be buried in dry sand. *Leaves* and *flowers* should be kept in tin canisters, or boxes lined with lead or tin. They should be frequently examined, as they are liable to mouldiness, to the attacks of insects, and to a greater or less deterioration by age. The London College directs that vegetables should be collected annually, and that those which have been kept longer than a year should be thrown away.

Drugs frequently require to be garbled, as it is termed, before they are in a proper state for use. *Senna* is to be separated from the stalks and legumes; *lichen* from moss, leaves, and sticks; *myrrh* from bdellium, &c., *gum Senegal* from Bassora gum and a terebinthinate resin, *flaxseed* from clover seed; *seneka* from ginseng; *spigelia* from the stems, and both it and *serpentaria* from the adhering dirt. Seroons of cinchona should be examined, and the barks assorted before they are put by for use. *Gums* and *gum-resins* should be garbled, and the clear transparent tears preserved separately.

Weights and Measures. A precise acquaintance with the recognised measures of weight and capacity is essential to the operations of the apothecary. The weights used by him in compounding medicines, are the troy pound and its divisions; those by which he buys and sells, the pound avoirdupois and its divisions. The former contains 5760 grains, the latter 7000 grains, so that 11 troy pounds are nearly equivalent to 9 pounds avoirdupois. The troy pound contains 12 ounces of 480 grains; the avoirdupois pound 16 ounces of $437\frac{1}{2}$ grains, eleven of the former being nearly equal to twelve of the latter. The troy ounce is divided for the use of the apothecary, into 8 drachms of 60 grains each, and the drachm into 3 scruples of 20 grains each. The United States and British Pharmacopœias all recognise the troy weights, and whenever in this work any term is used expressive of weight, it is to be understood as being of this denomination.

The measures used by the apothecary are the wine pint and the gallon. The wine pint contains 28.875 cubic inches. The weight of a pint of distilled water at 62° Fahrenheit and 30° of the barometer, is 7289.7 grains, or 1 pound 3 ounces 1 drachm 29.7 grains troy, or 1 pound 289.7 grains avoirdupois. The gallon is divided into 8 pints, the pint into 16 fluidounces, the fluidounce into 8 fluidrachms, and the fluidrachm into 60 minims. The weight of a fluidounce of water is 455½ grains, being 18 grains more than an avoirdupois ounce. A drop is generally though incorrectly considered as equivalent to the minim. Drops vary in size according to the nature of the fluid, and the size and shape of the lip from which they fall. A drop of water nearly equals a minim. A fluidrachm of antimonial wine will make, on an average, about 72 drops, one of laudanum 120 drops, and one of alcohol 138 drops. For a table showing the relative value of minims and drops, see the Appendix.

Measures are employed by the United States, London, and Dublin Pharmacopœias, with a few exceptions, to express the quantity of liquids in all their formulæ. The Edinburgh College employs weights exclusively. This should be borne in mind in comparing the formulæ of the different Pharmacopœias.

Fluids are to be dispensed from graduated measures, of which those holding from a fluidounce to a pint are hollow inverted cones; and those holding a fluidrachm, and graduated to every five minims, are cylindrical. For smaller quantities than five minims, a slender tube holding a fluidrachm may be used, having the aliquot parts divided off and marked with a diamond. Care should be taken to verify these instruments. The following approximate measures are used in prescribing medicines, viz. a wineglassful containing two fluidounces, a tablespoonful containing half a fluidounce, a dessertspoonful two fluidrachms, and a teaspoonful containing a fluidrachm.

Specific Gravity. The specific gravity of fluids affords one of the best tests of their purity. The instrument commonly used by the apothecary for ascertaining this is Baumé's hydrometer. This is a glass bulb loaded at one end and drawn out at the other into a tube on which the scale is marked. That used for alcohol is graduated by loading it until it sinks to the foot of the stem (which is marked zero) in a solution of one part of salt in nine parts of water. It is then put into water, and the place to which it sinks marks 10° of the scale, which is constructed from these data. The hydrometer for liquids heavier than water is made by loading it, so that in distilled water it shall sink to nearly the top of the stem. The place to which it sinks in a solution of 15 parts of salt in 85 parts of water is then marked as 15°, and the scale divided off. For a table exhibiting the value of these scales in specific gravities, see the Appendix.

The hydrometers commonly imported are so carelessly made that scarcely any two will agree, and little dependence is to be placed on their accuracy. A more certain method consists in weighing the liquid at a uniform temperature in a bottle, the capacity of which, in grains of distilled water, has been previously ascertained. If a bottle is selected which will hold exactly 1000 grains of water at 60°, the weight in grains of the quantity of any liquid which it will hold will be the specific gravity of the liquid. Such bottles are sold in the shops. If one is not attainable, an ordinary vial may be used, and the specific gravity obtained by dividing the weight of the liquid examined by the weight of the water.

Gay Lussac's centesimal alcoholmeter is a very useful instrument, being graduated so as to indicate the percentage of absolute alcohol in any mixture of spirit and water.

The specific gravity of a solid is ascertained by first weighing it in air and then in water, and dividing the former weight by the difference between the two.

Mechanical Division. One of the simplest means of preparing medicines, is their reduction, by mechanical means, to a state of minute division. This includes the various operations of pulverization, levigation, grinding, filing, rasping, sifting, bruising, slicing, &c.

The principal drugs which are sold in the state of powder, are pulverized by persons who pursue that occupation for a livelihood. The apothecary, therefore, is chiefly interested in knowing the loss sustained in this process. The following statement has been abbreviated from a table prepared by MM. Henry and Guibourt. One thousand parts of the substances mentioned yielded, when pulverized—

Roots.				*Vegetable Products.*	
Jalap	940	Cinnamon	890	Aloes	960
Rhubarb	920	Angustura	825	Tragacanth	940
Columbo	900	*Leaves.*		Opium	930
Liquorice	900	Hemlock	800	Gum Arabic	925
Valerian	860	Savine	800	Scammony	915
Elecampane	850	Digitalis	790	Catechu	900
Gentian	850	Belladonna	785	Liquorice (extract)	810
Florentine Orris	850	Senna	720	*Animal Substances.*	
Rhatany	850	Henbane	530	Castor	900
Calamus	840	*Flowers.*		Spanish Flies	850
Virginia Snakeroot	800	Chamomile	850	*Mineral Substances.*	
Ipecacuanha	750	Saffron	800	Red Oxide of Mercury	980
Squill (bulb)	820	*Fruits.*		Red Sulphuret of Mercury	950
Barks.		Mustard	950		
Cinchona, pale	875	Black pepper	900	Arsenious Acid	950
————, red	880	Nux Vomica	850	Sulphuret of Antimony	950
————, yellow	900	Colocynth	500	Tin	825

For the greater part of those drugs that are powdered in the shops, an iron, brass, glass, or Wedgwood mortar is to be used; the two former for hard substances requiring repeated blows; the latter for those which are friable and can be reduced to powder by trituration. The interior surface of the mortar should be concave and nearly spherical, and care should be taken not to impede the operation by overloading and clogging the pestle. In powdering acrid substances, the mortar should be covered with a board perforated in the centre for the pestle, or with a large piece of pliable leather tied round the top of the mortar and the handle of the pestle, so as to allow of the free motion of the latter. The operator should guard himself against the fine particles of very acrid substances, by standing with his back to a current of air, and covering his nostrils with a wet cloth. Various means are used to facilitate the operation of powdering. All vegetable substances must be carefully and thoroughly dried. Resins, gum-resins, and gums, must be powdered in cold frosty weather. Tragacanth and nux vomica must be dried in a stove heat, and powdered while hot. The fibrous roots, as liquorice and marshmallow, should be previously shaved into thin transverse slices. Agaric is to be powdered by beating into a paste with water, then drying and triturating it. Cloves and the aromatic seeds may be ground in a hand mill and afterwards triturated. Squill and colocynth, the comminution of which is sometimes aided by soaking them in mucilage of tragacanth and then drying, are best powdered in a dry atmosphere, after being thoroughly dried in a stove heat. Camphor requires the addition of a few drops of alcohol. The efflorescent salts may be obtained in the state of fine powder by exsiccation, and those which are insoluble in alcohol, may be precipitated by it, in an impalpable powder, from their aqueous solutions.

Care should be taken in powdering, previously to separate the inert portions and impurities, and to mix intimately the whole of the powder which is reserved for use. The central woody fibre of ipecacuanha and other roots, the virtues of which reside in the bark, is to be rejected. The first portions of those barks to which lichens and the dead epidermis adhere, are inert, as are also the last particles of the fibrous roots and barks. The outer coat of the aromatic seeds is to be reserved, and the inner albuminous part rejected as inodorous.

The fine particles in powdering are to be separated from time to time by sifting. Fine sieves should be made of that sort of raw silk called bolting cloth; coarser ones of wire, hair cloth, or gauze. Valuable or aromatic powders should be passed through box sieves, which are sieves provided with covers for the top and bottom, that shut up so as to prevent all waste.

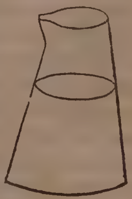
Ivory, horn, nux vomica, wood, and iron, are prepared for pharmaceutic purposes by filing or rasping; guaiacum wood by turning in a lathe; roots, stalks, and leaves by cutting with a large pair of shears, such as is used by the tinplate workers; or with a large knife fixed in a frame at one end, and furnished with a long handle at the other. Tin and zinc are granulated by melting them and strongly agitating whilst they are cooling; carbonate of potassa by stirring with a rod as it hardens.

Earthy insoluble substances are conveniently reduced to powder by *levigation.* This is performed by moistening them with alcohol or water, and rubbing them on a hard flat stone with a muller or rubber of the same material. The powder may be rendered impalpable by agitating it with a large quantity of water, and pouring off the liquid to settle, after the coarser particles have subsided. The fineness of the powder depends on its specific gravity and the length of time which elapses before the liquid from which it subsides is drawn off. This last operation is termed *elutriation*, and the thick pasty mass which remains, is usually dropped on an absorbent surface, and dried in the shape of small cones. Vanilla, mace, and other oily aromatic substances, may be rubbed to powder with sugar; magnesia and white lead, by friction on a wire or hair sieve.

Separation of Solids from Liquids. This is another mechanical operation which is frequently resorted to in practical pharmacy. It includes the processes of decantation, filtration, straining, expression, clarification, &c.

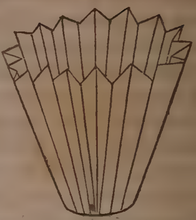
Solids may be separated from fluids when there exists no chemical action between them, by allowing them to subside. The supernatant liquid may then be carefully poured off; or it may be drawn off by a syphon; or separated by filtering. The last operation, or expression by a stronger force, is necessary to separate the whole of the liquid.

Precipitating jars of the shape figured in the margin, are sold in the shops, and will be found very useful.

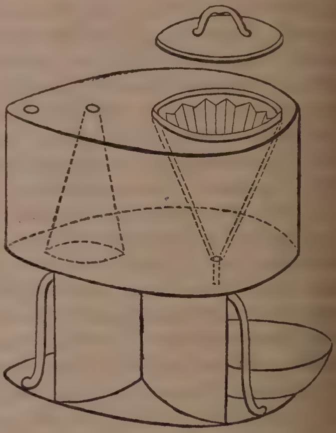


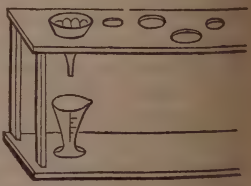
When the powder subsides slowly, or remains suspended, the liquid must be filtered.

The most convenient material for a filter is unsized paper. This is to be folded into a cone of the shape of the annexed figure, and placed in a glass funnel. It will serve for filtering tinctures, wines, saline solutions, watery infusions, and essential oils. In some cases it may be necessary to place a small cone of the same material outside of the large one, in order to



strengthen it. When the liquid is too viscid to pass readily through paper, a cotton or woollen bag of a conical shape may be used. Acids may be filtered through a layer of fine siliceous sand, supported in the neck of a glass funnel by pieces of glass gradually decreasing in size. Castor oil, syrups, and oxymels, may be readily filtered through coarse paper made entirely of woollen shreds. Melted fats, plasters, resins, and wax, may be *strained* through muslin stretched over a square frame or a hoop. Small sieves of fine bolting cloths serve for straining emulsions, decoctions, and infusions; and a temporary strainer for these purposes may be made by fastening a piece of muslin between the upper and lower parts of a common pill box, and then cutting off the ends so as to leave the rim only of the box around the muslin. The filtration of viscid substances is facilitated by heat. Filtration through bone black, is practised for muddy or dark coloured liquids. Much inconvenience is often experienced in the filtration of hot saturated saline solutions, by the cooling of the liquid and consequent crystallization of the salt in the filter and neck of the funnel. To obviate this, the tin apparatus represented in the wood cut, has been contrived by Professor Hare. The vessel is filled with hot water, which is kept at a boiling heat by a spirit lamp placed under the cavity having the shape of an inverted funnel. A glass funnel with a filter is placed in the other cavity, and the liquid passes through rapidly. In filtering alcoholic solutions, it is necessary to protect the liquid from the flame of the lamp, and for this purpose the partition underneath has been added. No apothecary should be without this useful apparatus. Frames of various sizes for holding funnels and filters will be found very useful; the wood cut represents the one commonly used. The efflorescence of saline solutions on the edge of the filtering paper may be prevented by dipping it in melted tallow or lard.





The filtration of liquids, which are altered by exposure to the air, requires much caution. A very simple method of accomplishing this, is to insert a slender tube of glass into the funnel, long enough to reach below the neck, while the upper part is nearly as high as the top of the funnel. The space between the tube and the neck, must be filled with bits of glass and fine sand, so as to form a good filtering bed; the liquid is to be poured in, and the top of the funnel covered with a plate of glass. If this be luted on, and the funnel luted into the neck of the bottle, the process will be performed with perfect accuracy.

Expression is required to separate the last portions of tinctures or infusions from the dregs.* A screw press is used for this purpose. The substance to be pressed is put into a cylinder of strong sheet tin, the sides of which are pierced with small holes. This is placed on a square tray of tin having a lip for pouring. A block of wood fits into the cylinder and is placed on the top, and the whole is put under the screw press, the pressure of which is gradually brought to bear upon it.

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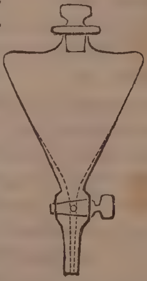
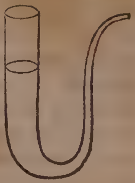
* The same object may be effected on the principle of *displacement*—a term applied to that operation by which any liquid impregnating a powder, may be expelled or displaced from it, to the last drop, by the addition of another fluid or a fresh portion of the same

This press is to be used for expressing the juices of fresh plants, and the mother liquor from precipitates or soft fibrous crystals. Previously to being pressed, plants must be well beaten in a mortar, and water added to those which are hard and dry.

The expressed oils are obtained by bruising the seeds which contain them, and enclosing the bruised mass in strong bags which are placed in a firm hollow frame and subjected to strong sudden pressure by driving up a wedge. Expressed oils are clarified from mucilage by boiling them with water.

Liquids in general are rendered clear by the addition of some coagulable substance, such as milk or an aqueous solution of ichthyocolla. The white of an egg beaten up with water, will coagulate by a gentle heat and clarify any liquid with which it has been mixed. The vegetable acids will clarify many of the expressed juices of plants.



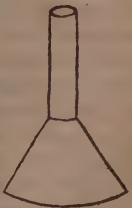


Separation of Liquids. Liquids which have no chemical affinity, and differ in specific gravity, may be separated by allowing them to remain at rest in the separating funnel represented in the annexed figure, and then drawing off the heavier fluid.

A very convenient method of separating fluids is by means of the separatory figured in the wood cut. The last drop of the heavier fluid may be drawn off by means of this instrument.

Application of Heat. The most efficient and economical means of obtaining heat is a subject of great importance to the pharmaceutist, on account of the variety of processes in which it is required.

With the small furnaces, which are now made of fire clay, of various patterns and sizes, almost all the operations of the laboratory which require heat, can be performed. The fuel used is charcoal, although anthracite will burn in those of a larger size, and is to be preferred where a uniform heat is necessary for several hours. The apothecary should be provided with a complete set of these useful utensils including ne with a dome for a reverberatory furnace. By adding pipe several feet in length to this, and urging the fire with a air of double bellows, the heat may be raised to that of an air urnace. A small pipe of sheet iron with a cone at the lower nd, as in the figure, to fit on the furnace, will be found an xcellent means of obtaining an intense heat in those of the mallest size. For operations on a smaller scale, the most conenient means of obtaining heat is by an alcoholic lamp. Alohol burns without smoke or smell, and is almost as cheap a



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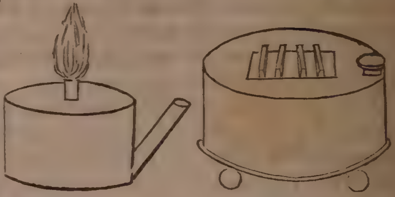
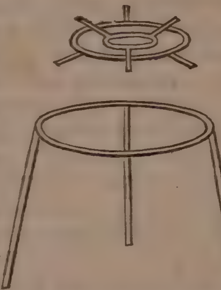
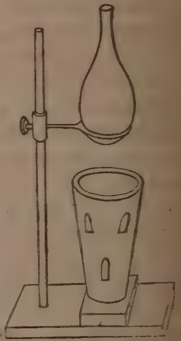
uid. All that is necessary is to pour the fluid upon the moist powder contained in the lter, in such a manner as to penetrate it equably. The added liquor thus drives before it at previously mixed with the powder, which may in this way be as completely exhaustas it can be by the press. In the preparation of tinctures or other medicated fluids tended for medical use, the displacing liquor should be the same with that employed as e menstruum; as the risk of contaminating the preparation with a foreign substance is us avoided.—W.

fuel as oil, to which it is on every other account preferable. The annexed figures represent the usual forms of spirit lamps. The larger one will be found very useful for heating spatulas for spreading plasters. For regulating the temperature and supporting the substance to be heated, iron tripods of various heights and sizes must be provided. These should be furnished with sets of concentric rings as in the figure, fitting into each other for vessels of different sizes. A very convenient support is the stand and ring figured in the wood cut, which will answer either for a spirit lamp, or a small furnace made from a black lead crucible as in the figure.



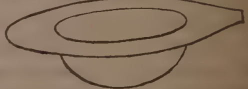


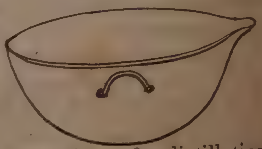


The operations which require the aid of heat are *fusion*, *solution*, and *evaporation*.

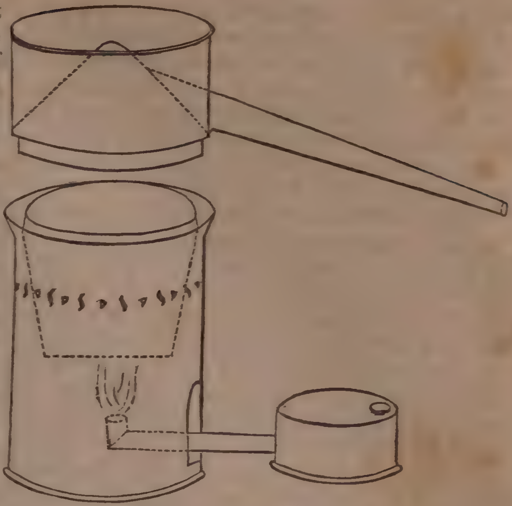
The temperature required for fusion, in pharmaceutical processes, seldom exceeds a red heat; and the vessels used are crucibles of silver, porcelain, Wedgwood ware, black lead, and fire clay (Hessian crucibles). Silver is used for the fusion of potassa, porcelain for nitrate of silver, and black lead and Hessian crucibles for the metals, glass of antimony, sulphuret of potassium, and the ordinary operations which require a great heat. They are each liable to objections; silver fuses too readily; porcelain and Wedgwood ware do not bear sudden changes of temperature; black lead, which bears these changes, is destroyed by saline substances and burns in a current of air; and the Hessian crucibles are so porous as to absorb and waste much of the fused substance. The crucibles should be covered with a lid or an inverted crucible, and should be supported at a little distance from the bottom of the grate, and surrounded and covered with ignited coals. The fusion of substances which soften and melt at a lower degree of heat, as wax, fat, plasters, &c., is called liquefaction. This operation is performed in open earthen, copper, or iron vessels, and care must be taken not to raise the heat so as to char or inflame the substance.

A *sand bath* is an indispensable part of the pharmaceutic apparatus. It is usually an iron pot or a shallow vessel of sheet iron capable of holding sand to the depth of four or six inches. It serves to regulate the action of the heat on vessels which do not bear a rapid change of temperature. It is sometimes heated to a red heat, as in preparing the mineral acids, though more frequently used for the evaporation of saline solutions and vegetable juices. The *water bath* is to be used in all cases in which a heat above that of boiling water would be injurious. A very convenient one, figured in the wood cut, consists of two copper vessels, the upper one of which is well tinned.



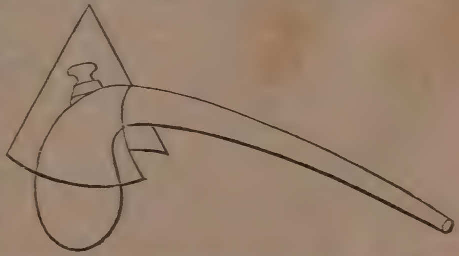


The common still and worm, the vessels in general use for distillation, are too well known to need description. A convenient still or alembic for



small operations, which may be heated by a spirit lamp, is figured in the wood cut. The top of the head is kept filled with cold water, and all escape of vapour is prevented by filling the space in which the head fits with water. The condensation of all the vapour is secured by adapting a worm or a long tube to the apparatus. The boiler of this still may hold one or two gallons, and it will be found a very useful means of recovering the alcohol in making alcoholic extracts. It may easily be converted into a water bath by fitting on the top of the boiler a vessel of convenient form.

For the extrication and condensation or absorption of gaseous fluids, a retort and series of three necked (or Wolfe's) bottles are used. The bottles are partly filled with water and become saturated in succession. As the tubes which convey the gas are plunged nearly to the bottom of the liquid in the bottles, there is danger, when the operation is complete, and a vacuum formed in the retort, of the water being driven by the atmospheric pressure in the last bottle, back through the whole series, so as to fill the retort. To prevent this, safety tubes must be fitted to the retort and the bottles. Those for the bottles are straight tubes, dipping a small depth into the liquid; that for the retort, is the common Welter's tube of safety. When the common glass retort and receiver are used for the distillation of fluids, care should be taken not to apply the luting until the atmospheric air is expelled. The chief objects to be aimed at are to keep the body of the retort hot and the neck and receiver cool. A hood of pasteboard or tin, as represented in the figure, will much facilitate the former, and the latter will be gained by keeping the neck and receiver wrapt in wet cloths, on which a jet of cold water is kept playing.



When the object of distillation is to preserve the residuum, and this is liable to injury from heat, as is the case with vegetable extracts, the operation is best performed in vacuo. For this purpose the still and recipient are made so as to form an air tight apparatus, and the latter is furnished with a stop cock, which is kept open until the whole of the atmospheric air is expelled by the vapour. It is then closed, and a vacuum formed and maintained in the recipient by surrounding it with cold water. The distillation is carried on in this manner at a much lower temperature than ordinary.

The vapours of some volatile solids have the property of condensing into the solid form, either in mass, or in a state of the most minute division. The operation in which this occurs, is called *sublimation.* When the product is compact, it is called a *sublimate*, when slightly adhering, it is called *flowers.* The operation is generally performed in a sand bath, and the apparatus consists of two vessels fitting each other, one being inverted over the other. The shape, size, and depth of the vessels, and the degree of heat to be applied, are regulated by the nature of the substance operated on.

Lutes. The most precious material for the chemists is glass, the transparency, insolubility, and hardness of which fit it for almost every purpose. It is often necessary to strengthen it by means of lutes, which will bear a heat at which glass would soften; and the application of lutes for this purpose, and for securing the junctures of tubes and vessels, is also an important part of the pharmaceutic art. Those lutes which are required for coating vessels exposed to a great heat, are made of Stourbridge clay. The clay is made into a paste with water mixed with chopped straw, and successive coats applied as they become dry. Earthenware vessels may be rendered impervious to air or vapours, by brushing over them a thin paste made of slaked lime and a solution of borax containing an ounce to the half pint. This is allowed to dry, and the vessel is then coated with slaked lime and linseed oil beaten till the mixture becomes plastic. Earthenware retorts thus coated, may be safely used more than once, the coating being renewed every time.

Fat lute is applied to the joinings of apparatus to prevent the escape of corrosive vapours. It is made like glazier's putty, pipe clay being substituted for whiting. It will bear a considerable heat, and great care must be taken that the part where it is applied be perfectly dry. If it is to be exposed to heat, slips of moistened bladder must be wrapped round it and secured with twine.

Roman cement and plaster of Paris may be applied in the same manner as fire clay; when used for securing the joinings of apparatus, a coating of oil or wax will render them air tight.

A very useful lute is formed by beating the white of an egg thoroughly with an equal quantity of water, and mixing with it some slaked lime in the state of fine powder, so as to form a thin paste. This must be spread immediately on slips of muslin and applied to the cracks or joinings intended to be luted. It soon hardens, adheres strongly, and will bear a heat approaching to redness without injury. A leak in this lute is readily stopped by the application of a fresh portion. Solution of glue, or any liquid albuminous matter, may be used in place of the white of eggs.

An excellent cement for surfaces of iron, consists of one part of sulphur, two of sal ammoniac, and eighty of iron filings, mixed together and slightly moistened. It is rammed or caulked into the joints, and solidifies perfectly in time.

White lead ground in oil, is an excellent cement for broken glass: spread upon linen, it forms a good coating for a cracked surface, but dries slowly.

Strips of bladder macerated in water, adhere well to glass, and are very useful.

A mixture of whiting and paste or gum water, spread upon strips of paper, forms an excellent luting for joinings not exposed to acrid vapours or a great heat.

A useful lute is formed by spreading a solution of glue on strips of cloth, and coating them, after they are applied, with drying oil.

Linseed meal beaten into a uniform mass with milk, lime-water, rye paste, or thin glue, and applied in thick masses, adheres well; and when dry, will resist most vapours.

Cap cement is made of six parts of resin, one part of yellow wax, and one of Venetian red. It is a very useful cement for fastening metals or wood to glass, and for rendering joints impervious to water. *Soft cement* is used for the same purposes, and is made of yellow wax melted with half its weight of turpentine, and coloured with a little Venetian red. It is very useful for rendering the stoppers of bottles perfectly air tight.

Chemical Operations. Some of the chemical processes conducted by the apothecary, have been explained in the former part of this introduction. It remains to notice some others in constant or frequent use. *Infusion* is the subjecting of a substance containing soluble principles to the action of a menstruum, which is usually water. Hot infusions are made by pouring boiling water on the substance, and allowing it to remain in a covered vessel till cold. Cold infusions are made with cold water, and require several hours to attain their full strength. *Maceration* is the term employed to denote the action of liquids upon medicines, when allowed to remain upon them for several days, at a heat of from 60° to 90°. *Digestion* is the name given to the same operation, when conducted at a temperature of between 90° and 100°. It is commonly performed in glass bottles or flasks, and a common fire or stove heat is employed. *Decoction*, or boiling, is sometimes employed in extracting the virtues of plants, but is often disadvantageous, as most of the proximate principles of vegetables are altered by it, especially when long continued. Where it is practised, the ebullition should generally be continued for a few minutes only, and the liquid be allowed to cool slowly in a close vessel.

From the solutions of vegetable principles obtained by these different processes, extracts are prepared by slow *evaporation*, so as to *inspissate* the liquid. This process should, as has already been mentioned, be always conducted at a heat not exceeding that of boiling water. Evaporation at a gentle heat is also performed for the *concentration* of saline solutions, in order to promote their *crystallization*. The proper degree of concentration is attained, if a drop of the liquid on a cold glass plate deposites crystals. The slower the evaporation and the cooling, and the greater the quantity operated on, the larger will be the crystals.

Water which is saturated with any salt is still capable of dissolving other salts. It is in this way, by washing crystals of impure salts with their own saturated solutions, that the crystals are purified. Fine silky crystals, which retain their mother water by capillary attraction, must be dried by strong expression in a linen bag. The finest silky crystals may be entirely freed from their adhering liquid by placing them in a funnel which fits closely to one of the necks of a double mouthed bottle, and fitting a tube to the other, through which air is drawn. The current of air, in passing through the funnel, carries the water with it, and dries the crystals perfectly.

Lixiviation is a process used for separating a *soluble* from a porous *insoluble* body. It consists in placing the substance to be lixiviated in a vessel, the bottom of which is covered with straw, &c., pouring water upon it, allowing the water to remain until saturated, and then drawing it off through an opening at the bottom of the vessel.

Precipitation is sometimes mechanical, as in the process of *levigating* and *elutriating* the carbonate of lime, and sometimes chemical, as in the preparation of this salt by decomposing the muriate of lime. When a precipitant is directed to be added until no further precipitation takes place, the fact may be ascertained by taking a drop of the liquid on a glass plate, and trying it with the precipitant. The formation of a precipitate is often much assisted by agitation or by heat. The separation of the supernatant liquid from the precipitate is most effectually accomplished by means of a syphon. When the liquid is a saline solution, it is necessary to wash the precipitate until the water exhibits no trace of the salt. In doing this, great care must be taken to select the purest and clearest water, and the ultimate drying of the precipitate must be performed in a filter, or on a porous stone.

The operations which require a heat greater than that used in digesting, are *liquefaction*, *fusion*, *calcination*, *ustulation*, *incineration*, *distillation*, and *sublimation*.

Liquefaction is the melting of those substances that become soft previously to fusion, as wax, tallow, plasters, &c. The heat employed is always below that at which charring takes place.

Fusion is employed in pharmacy in preparing the nitrate of silver and caustic potassa for casting into cylinders. The former must be melted in a porcelain, the latter in an iron crucible. The moulds in which they are cast are formed of two thick plates of cast iron, with semi-cylindrical grooves that fit accurately to each other. Fusion is also used in preparing the glass of antimony.

Calcination is a term applied to the changes produced in mineral substances by intense heat, not attended with fusion and leaving a solid residue, and is often synonymous with oxidation. The term *ustulation* is restricted to the metallurgic operations of roasting ores, to drive off the volatile matters, as arsenic, &c. Calcination is often used to express the ustulation or burning of carbonate of magnesia. This is to be performed in an earthen vessel at a red heat. Exposure to the hottest part of a potter's furnace during the burning of the kiln, is an excellent mode of performing the operation. More commonly, the magnesia is burnt in an iron pot, which is objectionable, as the heat soon oxidates the iron, and the oxide scales off and mixes with the magnesia, which is seldom free from iron when prepared in this way.

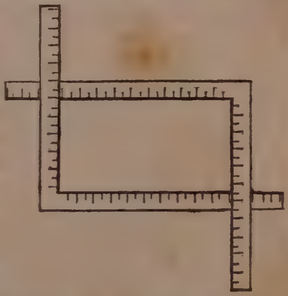
Incineration, as the name expresses, is the operation of burning substances for the sake of their ashes. It is performed in obtaining the phosphate of lime—the Cornu Ustum of the London Pharmacopœia. The bones are burnt in an open fire until all the inflammable matter is consumed.

Distillation and *sublimation* have already been spoken of. The former is used for separating a more volatile liquid, as ether or alcohol, from one less so; for impregnating a liquid with the volatile principles of plants, to the exclusion of other principles, as in the preparation of aromatic spirits and waters; and for separating, by means of aqueous vapour, the essential oils and volatile proximate principles of the vegetable kingdom. The first process is termed *rectification*. When the second process is repeated with the same liquid and a fresh quantity of the plant, the operation is termed *cohobation*. In submitting the solid parts of vegetables to distillation in the two latter processes, it will be found advisable to expose them to the action of vapour on a grate or in a basket, so as to preserve them from touching the bottom of the still, where they would be liable to be heated so as to become empyreumatic. Distillation is also used for obtaining the volatile products which result from the decomposition by heat of substances of animal or vegetable origin. The *oils* which are obtained in this manner are called *empyreumatic oils*. Sometimes the result is an acid, as the succinic acid, and sometimes the volatile alkali, as in the destructive distillation of animal substances.

Dispensing of Medicines. A large portion of the operations of the apothecary is performed in the shop extemporaneously. In dispensing medicines from the counter, he is continually called upon to put his previous knowledge in practice, and often to substitute extemporaneous for the regular officinal formulæ. There is no part of his business which requires for its proper performance so much ready judgment, and such accurate knowledge. A few directions, suggested by running the eye over the list of preparations of the Pharmacopœia may be found useful.

It may sometimes be necessary for the apothecary to make extemporaneously an aromatic water, which is not usually kept in the shops. In this case, he is to prepare it by rubbing a drop of essential oil with one or two grains of carbonate of magnesia, for every fluidounce of water, and filtering.

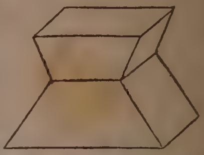
It is sometimes desirable to apply plasters prepared from the narcotic herbs. These may be made extemporaneously by mixing the soft extracts of the plant with about an equal weight of melted adhesive plaster, keeping the mixture soft, and stirring it until the moisture is evaporated. The most suitable material on which to spread plasters is soft white leather. A margin of half an inch should be allowed to remain around the plaster. The plaster iron or spatula may be heated in the large spirit lamp, figured in page 694. A skilful apothecary will be able to spread the plaster uniformly and evenly, without overheating it so as to penetrate or corrugate the leather. A convenient instrument for determining the size and preserving a straight edge, consists of two squares made of tin and graduated to inches, as in the annexed figure. For plasters of irregular shapes, pieces of paper may be cut out and pasted on the leather, so as to enclose a space of the required dimensions. The plaster should first be melted on a piece of brown paper, and then transferred to the leather, in order to prevent its being applied at too great a heat.



Decoctions and infusions are often ordered in prescriptions in the quantity of a few ounces. A very convenient vessel for preparing them in, is the common nursery lamp, which consists of a cylindrical vessel, open at the side for a spirit lamp, and at the top to receive a tea pot or tin boiler.

The neutral mixture is known to be saturated perfectly, when it does not affect litmus paper, either in its blue state or when reddened by acid. For preparing this and the effervescing draught, it is advisable to keep in the shop a solution of carbonate of potassa, containing an ounce to the pint. The silica which this salt contains, subsides on exposure, and leaves a perfectly clear solution, whereas that prepared at the time it is to be used, always becomes turbid after being saturated. The carbonic acid which is extricated on preparing the neutral mixture, combines at first without effervescence with the remaining carbonate and forms a bisalt. This circumstance may lead, unless the solution be tested, to the supposition that the mixture is saturated.

Powders are often mixed together with difficulty, by means of a pestle and mortar, on account of their differing greatly in weight, or of their softness and compressibility. In these cases, frequent stirring with a pallet knife becomes necessary to produce a perfect mixture. In dividing powders into doses, it is very desirable to fold the packages neatly and of a uniform size; the powder folder represented in the figure is very useful for this purpose. It may be made of mahogany or other hard wood.



It is important to the apothecary to ascertain the best means of combining substances which have no affinity for each other. This can often be done by means of a third substance. Water can be saturated with camphor by means of magnesia, and an aqueous mixture of any strength may be made with it, by triturating the camphor with magnesia and shaking the mixture before using it. Camphor softens the gum-resins and solid fats and oils, and may be rendered permanently soluble in water in considerable quantity, by trituration with a fifth part of myrrh. In preparing oily emulsions in which gum Arabic or gum and sugar are the medium, a sufficient quantity of water must be added to convert them into a thick mucilage before adding the oil, which must then be thoroughly mixed with it and the remaining water added gradually with great care. Sulphuric ether is rendered more soluble in water by trituration with spermaceti. The mixture should be filtered to separate the superfluous spermaceti. Mixtures that contain the resinous tinctures, should also contain syrup, with which the tinctures should first be mixed, and the water then added very gradually. If a mixture contains laudanum and a fixed oil, the former should be first mixed with the syrup, and the oil afterwards incorporated, and lastly the water; the mixture will not otherwise be uniform.

In ordering pills, care must be taken to avoid the use of deliquescent salts, and to deprive those which are used, of their water of crystallization. The mass must be thoroughly incorporated previously to being divided; and this is particularly important when extracts of different degrees of hardness enter into the composition. A section of the mass should be throughout of uniform colour and consistency. Pills are to be rolled and preserved in powdered liquorice root, which ought to be kept for use in a tin box with a perforated lid, like a pepper box. When pills are of too soft a consistence, a little liquorice powder may be incorporated with them to render them more firm. Pills into the composition of which gum Arabic enters, should be softened with syrup and not with water; as the latter renders the mass difficult to roll.

The proper cleanliness of his vessels is an object of great importance to the apothecary. Open vessels, as mortars and measures, are easily cleansed, and should be wiped dry immediately after being washed. Fats and resins are easily removed by pearlash, or tow and damp ashes, or sand. Red precipitate and other metallic substances, may be removed by a little nitric or muriatic acid. Bottles may be cleansed from most kinds of impurity, by well shaking them with shreds of coarse grocers' paper and a little clean water. They may be freed from oil by means of a little strong nitric acid, after the action of which water will thoroughly clean them. Long sticks with sponges or dry cloths at the end should be provided for wiping dry the interior of flasks and bottles. A wire, bent at the end into a sort of hook, will be found useful for getting corks out of bottles. A loop of twine will also be found a very convenient means of effecting the same object. When the glass stopper of a bottle is fast, it may often be loosened by gently tapping its sides alternately with the handle of a pallet knife. Sometimes a drop or two of oil, alcohol, or water, will soften or dissolve the cementing substance. It will sometimes answer to wrap the stopper in a cloth, insert it in a crevice or hole in a table or door, and twist the bottle gently and dexterously. Sometimes the stopper may be loosened by quickly expanding the neck in the flame of a lamp, and tapping the stopper before the heat has reached it.

The apothecary should be provided with pallet knives of wood, bone, and horn, as well as of steel. It should be an invariable rule to clean every knife and graduated measure immediately after they are used, and to put the dirty mortars apart from those which are clean. Too much particularity and order in all the minute details of the shop cannot be practised. The counters and scales should be cleaned once a day, and brushed as often as they become dusty. The bottles should be replaced as soon after being taken down and used as possible, and should on no account be changed from their accustomed place on the shelf. For the proper preservation of leaves, flowers, aromatic powders, calomel, and other medicines to which light is injurious, the bottles should be coated with tin foil or black varnish.

No apothecary should be destitute of a set of troy weights; as without them he will be utterly unable to comply with the officinal directions for the preparation of his medicines. In dispensing medicines, no vial nor parcel should be suffered to leave the shop without its appropriate label; and this, in the case of prescriptions, should always be the physician's direction as to the manner of taking it, and not the name of the medicine, unless it be so directed by him. The prescription or a copy of it should be retained and numbered, and the same number marked on the bottle or parcel. Every thing connected with the shop, and the dispensing and putting up of medicines and parcels, should be characterized by *neatness*, *accuracy*, *system*, and *competent knowledge*.

The apprentice who desires to qualify himself for his business should carefully study Turner's Elements of Chemistry, and Faraday's invaluable treatise on Chemical Manipulation, which may be termed the hand books of his profession. D. B. S.

As all the processes of the British Colleges are either described or fully detailed in the following pages, it is proper that the prefatory explanations of the several Pharmacopœias should be introduced in this place, in order that the reader may be prepared to understand the precise signification of the terms employed.

The Pharmacopœias recognised in this work unite in the use of the *troy* pound, and its divisions of ounces, drachms, scruples, and grains, for the expression of weights; and the *Edinburgh College* employs no other measure of quantity, whether of solids or liquids. In the *United States* Pharmacopœia, and in those of *London* and *Dublin*, the quantity of fluids is generally indicated by the liquid measure, consisting of the wine gallon and its divisions of pints, fluidounces, fluidrachms, and minims. (See tables of weights and measures in the Appendix.) It is highly necessary that the apothecary should understand that this distinction is rigidly observed in all the details which follow, and that whenever the simple terms pound, ounce, and drachm, are employed, they must be considered as belonging to the denomination of troy weight. This caution is the more necessary, as these terms are often confounded with the corresponding divisions of liquid measure, viz. the pint, fluidounce, and fluidrachm.

The *London College*, in giving the specific gravity of bodies, considers them at the temperature of 55° Fahrenheit, the *Edinburgh* and *Dublin*

Colleges at 60°; and the latter is the degree intended by the United States Pharmacopœia, though not expressly stated.

The *London College* explains the term *gentle heat* as signifying a temperature between 90° and 100°; the *Edinburgh College*, between 90° and 110°. The *Dublin College* employs the terms *superior*, *medium*, and *inferior heat*, the first signifying a temperature between 200° and 212°, the second between 100° and 200°, and the third between 90° and 100°.

Maceration, according to the *Edinburgh College*, is performed at ordinary temperatures; according to the *Dublin*, at a temperature between 60° and 90°. *Digestion* is performed by the latter College at an "*inferior heat;*" by the former, at about 100°, when not otherwise expressed.

The *London* and *Dublin Colleges* direct that mortars, measures, funnels, and other vessels in which medicines are prepared, should be made of materials containing neither copper nor lead. Earthen vessels, therefore, glazed with lead, are improper. The former College also directs that acid, alkaline, earthy, and metallic preparations, and salts of every kind, be kept in stopped glass bottles. W.

ACETA.

Vinegars.

Under this title, in the United States Pharmacopœia, are included both Distilled Vinegar and those preparations usually denominated *Medicated Vinegars.* The latter are infusions or solutions of various medicinal substances in vinegar or acetic acid. The advantage of vinegar as a menstruum is that in consequence of the acetic acid which it contains, it will dissolve substances not readily soluble or altogether insoluble in water alone. It is an excellent solvent of the vegetable alkalies, which it converts into acetates, thereby modifying in some measure, though not injuriously, the action of the medicines of which they are ingredients. As ordinary vinegar contains principles which promote its decomposition, it should be purified by distillation before being used as a solvent. Infusions prepared with it, even in this state, are apt to spoil in a short time; and a portion of alcohol is usually added to contribute to their preservation. A small quantity of acetic ether is said to result from this addition; and, on the continent of Europe, the place of the alcohol is frequently supplied by an equal amount of concentrated acetic acid. In consequence of their liability to change, the medicated vinegars should be made in small quantities, and kept but for a short time. W.

ACETUM DESTILLATUM. *U.S.* ACIDUM ACETICUM DILUTUM. *Lond.;* ACIDUM ACETICUM TENUE. *Ed.;* ACETUM DISTILLATUM. *Dub.* *Distilled Vinegar.*

"Take of Vinegar *a gallon*. Distil the Vinegar by means of a sand-bath, from a glass retort into a glass receiver. Reject the first pint, and preserve the five pints which next come over." *U.S.*

The *London* process for distilled vinegar differs from the above, in directing six pints instead of five to be preserved after the rejection of the first pint, and in ordering a cool receiver. The *Edinburgh* College rejects the first eighth in the distillation, and preserves the succeeding five-eighths; but it continues the distillation afterwards, so long as colourless acid is obtained; and this last portion, being mixed with the first rejected portion, is kept to be applied to various chemical purposes. The *Dublin* College distils wine-vinegar. The first tenth which comes over is rejected, the next eight-tenths are the "distilled vinegar," having the sp. gr. 1.005, and one-tenth is left behind in the retort.

Vinegar is a very heterogeneous liquid, containing colouring matter, mucilage, alcohol, &c.; and the object of its distillation is to purify it. (See *Acetum.*) The first portion which comes over contains alcohol and pyroacetic spirit, these being the most volatile ingredients; next the acetic acid comes over much purified, but weaker than it exists in the vinegar, on account of its being less volatile than water; and there remains in the retort a liquid of a deep brown colour, very sour and empyreumatic, and containing free tartaric and malic acids, bitartrate of potassa, and extractive. This statement explains why the first portion which comes over is rejected, and why the last portion is not distilled, or, if drawn off as directed by the Edinburgh College, is reserved for other than medicinal purposes. The proportion preserved by the Pharmacopœias is different. According to those of the United States and Edinburgh, it is five-eighths of the vinegar employed, according to the London six-eighths, and according to the Dublin eight-tenths. The distillation should certainly be continued as long as the product is free from empyreumatic taste; and we are assured by Dr. Barker, the commentator on the Dublin Pharmacopœia, that eight-tenths of the vinegar may be distilled without empyreuma. If this statement be correct, the Dublin process is the best, as being the most productive, without any sacrifice of the quality of the distilled vinegar. The residuary liquid in the retort, if diluted with an equal bulk of hot water, and mixed with pure animal charcoal in the proportion of half an ounce to the pint, may be made to yield, by a fresh distillation, an additional quantity of weak acetic acid, equally strong and pure with the officinal distilled vinegar. (See *Carbo Animalis.*)

The different Pharmacopœias direct the distillation of vinegar to be conducted in glass vessels; but it is generally distilled in a copper alembic furnished with a pewter worm as a refrigerator. The use of these metals, however, is hazardous, on account of the danger of metallic impregnation. Mr. Brande has suggested that the refrigerator might be made of very thin silver, a metal not acted on by acetic acid of any strength. Empyreuma is effectually prevented by distilling by means of steam. In Great Britain the purification of vinegar by distillation is nearly superseded by the use of purified pyroligneous acid in a dilute state. One pound of this acid mixed with five pounds of water, furnishes a dilute acid of the sp. gr. 1.009, which is about the strength of distilled vinegar.

Properties. Distilled vinegar is a limpid and colourless liquid, of a weak acid taste and smell, less agreeable than those of common vinegar. Its sp. gr. varies from 1.007 to 1.009. A fluidounce of the former specific gravity will saturate 28 grains of carbonate of ammonia, 35 grains of carbonate of potassa, and 58½ grains of crystallized carbonate of soda. It is not a perfectly pure solution of acetic acid in water; but contains a portion of mucilage which rises in the distillation. It is on account of the partial decomposition of this impurity, that distilled vinegar, when saturated with an alkali, is liable to become of a reddish or brownish colour. When distilled in metallic vessels, it is apt to contain traces of copper, lead, and tin. Copper is easily detected by the addition of ferrocyanate of potassa, which produces a brown cloud; lead, by sulphate of soda, which occasions a white precipitate, and tin, by a solution of muriate of gold, which causes a purplish appearance. The two latter metals are discovered also by sulphuretted hydrogen, which occasions a dark-coloured precipitate. Distilled vinegar should not have an empyreumatic taste or sulphureous smell. Malt vinegar contains a small portion of sulphuric acid, but when it is distilled, this acid does not come over. If, however, sulphuric acid should be accidentally present in distilled vinegar, it may be detected by muriate of baryta.

Distilled vinegar is not of uniform strength. When of the sp. gr. 1.007, it contains 3.42 per cent. of anhydrous acid, and 4.73 per cent. of the same acid, when its density is 1.009.

Medical Properties and Uses. The medical properties of distilled vinegar are the same as those of common vinegar (see *Acetum*); but the former being purer, and not liable to spontaneous decomposition, is preferable for pharmaceutical purposes. It is employed as the basis, with but few exceptions, of the two classes of preparations called "Vinegars" and "Oxymels."

Off. Prep. Emplastrum Ammoniaci, *Lond.*, *Ed.;* Hydrargyri Acetas, *Dub.;* Liquor Ammoniæ Acetatis, *Lond.*, *Ed.*, *Dub.;* Liquor Plumbi Subacetatis, *Lond.*, *Dub.;* Oxymel, *Ed.*, *Dub.*, *Lond.;* Plumbi Acetas, *Dub.*, *Ed;* Potassæ Acetas, *Dub.*, *Ed.;* Sodæ Acetas, *Dub.;* Syrupus Allii, *U.S.*
B.

ACETUM COLCHICI. *U.S.*, *Lond.*, *Dub.* *Vinegar of Meadow-saffron.*

"Take of [dried] Meadow-saffron Root, sliced, *two ounces;* Distilled Vinegar *two pints;* Alcohol *a fluidounce.* Macerate the Meadow-saffron Root with the Vinegar, in a close glass vessel, for seven days; then express the liquor, and set it by that the dregs may subside; lastly, pour off the clear liquor, and add the Alcohol." *U.S.*

The *London* and *Dublin Colleges* direct an ounce of the fresh root or bulb, a pint of distilled vinegar, a fluidounce of proof spirit, and a maceration of three days. The resulting preparation may be considered identical with the American; as the dried bulb of our shops is probably not on an average stronger than the fresh bulb in Europe, and the proof spirit of the British Colleges is equivalent to little more than half its bulk of our officinal alcohol.

Vinegar is an excellent solvent of the active principle of colchicum; and the organic alkali of the latter loses none of its efficacy by combination with the acetic acid of the former. The use of the alcohol is simply to retard the spontaneous decomposition to which this, like most of the other medicated vinegars, is liable.

Medical Uses. The preparation has been extolled as a diuretic in dropsy; and may be given in gout, rheumatism, and neuralgia; but the wines of colchicum are usually preferred. The dose is from thirty drops or minims, to a fluidrachm.

Off. Prep. Syrupus Colchici, *U.S.* W.

ACETUM OPII. *Dub.* *Vinegar of Opium.*

"Take of Turkey Opium *four ounces;* Distilled Vinegar *a pint.* Rub the Opium into a pulp with a little of the Vinegar, then add the remainder of the Vinegar. Macerate the mixture in a close vessel for seven days, frequently shaking. Pour off the supernatant liquor: lastly filter."

The vinegar of opium was introduced into the last edition of the Dublin Pharmacopœia, as a substitute for the preparation in common use under the name of *black drop*, the purposes of which it is calculated to answer, without being liable to the same objections. We prefer, however, the

Tinctura Opii Acetata of the United States Pharmacopœia, which has taken the place of the Acetum Opii of the first edition of that work. From the want of alcohol, the Dublin preparation must be liable to spontaneous decomposition, and consequently to variation in strength; and we suspect that there is some waste of opium, as Dr. Montgomery, in his observations upon the Dublin Pharmacopœia, states that twenty drops are equivalent to thirty of the common tincture of opium, though in the preparation of the latter, somewhat less than one-third the quantity of opium is used. For further remarks in relation to the *black drop*, the reader is referred to the article *Tinctura Opii Acetata.* W.

ACETUM SCILLÆ. *U.S., Lond., Dub.* ACIDUM ACETICUM SCILLITICUM. *Ed.* *Vinegar of Squill.*

"Take of Squill, sliced, *four ounces;* Distilled Vinegar *two pints;* Alcohol *a fluidounce.* Macerate the Squill with the Vinegar, in a close glass vessel, for seven days; then express the liquor, and set it by that the dregs may subside; lastly, pour off the clear liquid, and add the Alcohol." *U. S.*

The *London College* directs a pound of recently dried squill, six pints of diluted acetic acid (distilled vinegar), half a pint of proof spirit, and maceration with a gentle heat for twenty-four hours. The *Edinburgh College* directs an ounce of dried squill, fifteen ounces of weak acetic acid (distilled vinegar), an ounce and a half of Alcohol, and maceration for seven days. In the *Dublin* process, the ingredients are in the same proportion as in the London, but in half the quantity; and rectified spirit is employed instead of proof spirit. The maceration is continued, without heat, for seven days.

The process of the last edition of the United States Pharmacopœia, is a great improvement upon that of 1820. In the latter, which was intended to be identical with the Edinburgh process, the proportion of vinegar was increased by the inadvertent adoption of a pint as equivalent to the troy pound; and the liability to spontaneous decomposition was rendered greater by the substitution of vinegar boiled with charcoal, and improperly called "purified vinegar," for the distilled. In the revised process, the proportion of the squill and solvent is the same as in the London and Dublin processes, and the desirable object of uniformity is thus promoted, while a stronger preparation is secured. The quantity of alcohol, which was before unnecessarily large, has been much diminished, and, though rather less than that directed by any of the British Colleges, is deemed sufficient—exceeding considerably the amount ordered in the Paris Codex. The only object of the alcohol is to retard the decompostion of the vinegar of squill; while its presence is medically injurious by rendering the preparation too stimulating. It is best, therefore, to prepare the vinegar frequently, and in small quantities, so as to require little alcohol for its preservation. In the preparation of the oxymel and syrup of squill, for which purpose the vinegar is chiefly used in this country, it should be employed without alcohol. The vinegar of squill deposites, upon standing, a precipitate which consists, according to Vogel, of citrate of lime and tannin.

Medical Uses. This preparation has all the properties of the squill in substance, and is occasionally prescribed as a diuretic and expectorant in various forms of dropsy and of pulmonary disease; but the oxymel and syrup are usually preferred, as they keep better and are less unpleasant to he taste. The dose is from thirty mimims to two fluidrachms; but the latter uantity would be apt to produce vomiting. It should be given in cinnamon-water, mint-water, or some other aromatic liquid calculated to conceal its taste and obviate its nauseating effect.

Off. Prep. Oxymel Scillæ, *U.S.*, *Lond.*, *Dub.;* Syrupus Scillæ, *U.S.*, *Ed.* W.

ACIDUM ACETICUM AROMATICUM. *Ed. Aromatic Acetic Acid.*

"Take of dried Rosemary Tops, dried Sage Leaves, each, *an ounce;* dried Lavender Flowers *half an ounce;* Cloves, bruised, *half a drachm;* Weak Acetic Acid [Distilled Vinegar] *two pounds.* Macerate for seven days, express the liquor, and filter it through paper." *Ed.*

This is a solution of various volatile aromatic oils in distilled vinegar, and serves as a grateful refreshing perfume in the chambers of the sick. It was intended as a simplification of the thieves' vinegar—*vinaigre des quatres voleurs*—formerly esteemed a prophylactic against the plague and other contagious diseases. In the present state of knowledge, it is hardly necessary to observe, that neither the original nostrum, nor its substitute, has any other power of protecting the system against disease, than such as may depend on its slightly stimulant properties, and its influence over the imagination. W.

ACIDUM ACETICUM CAMPHORATUM. *Ed.*, *Dub.* *Camphorated Acetic Acid.*

"Take of Acetic Acid *six fluidounces* [six ounces, *Ed.*]; Camphor *half an ounce;* Rectified Spirit *a sufficient quantity.* Reduce the Camphor to powder by means of the spirit; then add the acid, and dissolve." *Dub.*

The use of the alcohol is simply to facilitate the pulverization of the camphor, and a few drops are sufficient. Acetic acid in its concentrated state readily dissolves camphor. In this preparation, the whole of the camphor is taken up by the acid. In consequence of the powerful chemical agency of the solution, and its extreme volatility, it should be kept in glass bottles accurately fitted with ground stoppers.

The camphorated acetic acid is an exceedingly pungent perfume, which, when snuffed up the nostrils, produces a strongly excitant impression, and may be beneficially resorted to in cases of fainting or nervous debility. It is an officinal substitute for Henry's *aromatic spirit of vinegar.* W.

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ACIDA.

Acids.

Acids, in chemical classification, are those compounds which are capable of uniting in definite proportions with alkalies, earths, and metallic oxides, with the effect of producing a combination, in which the properties of its constituents are mutually destroyed. Such combinations are said to be neutral, and are denominated salts. Most acids have a sour taste, and possess the power of changing vegetable blues to red; and though these properties are by no means constant, yet they afford a ready means of detecting acids, applicable in practice to most cases. The above explanation of the nature of an acid is that usually given; but, according to strict definition, acids are compounds having a strong electro-negative energy, and, therefore, possessing a powerful affinity for electro-positive compounds, such as alkalies, earths, and metallic oxides. It is this antithesis in the electrical condition of these two great classes of chemical compounds that gives rise to their mutual affinity;

which is so much the stronger, as their contrast in this respect is greater. In the majority of cases, the electro-negative compound or acid, is an oxidized body, but by no means necessarily so. When it does not contain oxygen, this element is usually replaced by hydrogen. These peculiarities in composition have given rise to the division of acids into *oxacids*, and *hydracids*. *Vegetable acids*, for the most part, contain both oxygen and hydrogen.

A small number only of the acids are used in medicine; but among these are to be found examples of the three kinds above indicated. B.

ACIDUM ACETICUM. *U.S., Dub.* ACIDUM ACETICUM FORTIUS. *Lond.;* ACIDUM ACETICUM FORTE. *Ed.* *Acetic Acid.*

"Take of Acetate of Soda, in powder, *a pound;* Sulphuric Acid *half a pound.* Pour the Sulphuric Acid into a glass retort, and gradually add the Acetate of Soda; then, by means of a sand-bath, distil the Acetic Acid, with a gentle heat, till the residuum becomes dry. The specific gravity of this acid is 1.0634." *U.S.*

"Take of Acetate of Potassa *one hundred parts;* Sulphuric Acid *fifty-two parts.* Put the acid into a tubulated retort, and at different intervals of time, add the Acetate of Potassa, waiting after each addition until the mixture becomes cool. Lastly, with a moderate heat, distil the acid until the residuum is dry. The specific gravity of this acid is 1.074." *Dub.*

"Take of Dried Sulphate of Iron *a pound;* Acetate of Lead *ten ounces.* Having rubbed them together, put them into a glass retort, and distil by means of a sand-bath, with a moderate heat, so long as any acid comes over." *Ed.*

The London College has no formula for preparing acetic acid; but includes it among the articles of the Materia Medica, with the following explanatory remark. "Acetic Acid distilled from wood, [and purified?], the specific gravity of which is 1.046. One hundred grains of this acid will saturate eighty-seven grains of crystallized subcarbonate of soda."

These processes are intended to furnish a strong acetic acid. The *United States* and *Dublin* formulæ are similar, consisting in the decomposition of the acetate of soda or of potassa by sulphuric acid. A sulphate of the alkali is formed, and the disengaged acetic acid distils over. The acetate of soda, however, is on several accounts the best salt for decomposition. Its advantages are, its uniform composition in the crystallized state, its giving rise to a residuary salt (sulphate of soda) easily washed out of the retort, and the abundance in which it can be obtained from the manufacturers of pyroligneous acid. (See *Sodæ Acetas.*) On the other hand, acetate of potassa is a deliquescent salt, and, therefore, liable to contain a variable quantity of water, and to yield an acid of variable strength. Besides, the residue of the process (sulphate of potassa) is not so easily removed from the retort. In either process the acetic acid is apt to pass over, contaminated with a small quantity of sulphurous acid, which, however, may be removed by a redistillation from a little acetate of lead. In the process of the *Edinburgh* College, a double decomposition first takes place, resulting in the formation of sulphate of lead and acetate of iron. Subsequently the latter salt is decomposed, and yields its acetic acid, which distils over; while the sulphate of lead, mixed with the oxide of iron, remains in the retort. This College does not state the specific gravity or saturating strength of its acid. The acid of the *London* College may be considered as obtained in the same way as that of the United States Pharmacopœia; for the acid no doubt *intended* to be designated by the College, is the *purified* acetic acid from wood, and this is made by converting the impure pyroligneous acid into a pure acetate of soda, and decomposing this by sulphuric acid. How the acetate of soda is obtained from the impure acid, is explained under another head. (See *Sodæ Acetas.*)

Of the different officinal acids, the density of which has been specified, the acid of the Dublin College is the strongest, that of the London, the weakest, while the acid of the United States Pharmacopœia is intermediate in its strength. The Dublin acid, when properly prepared, is necessarily stronger than that of our national Pharmacopœia; because acetate of potassa contains but two, while acetate of soda contains six equivalents of water; and it is from the water present in the acetate employed, together with that in the liquid sulphuric acid, that the acetic acid obtained, derives the water with which it is diluted.

Besides the methods above mentioned, there are several others for procuring strong acetic acid. Thus it may be obtained from acetate of lead; and this, according to Berzelius, is the least expensive process that can be adopted. This method consists in distilling with a gentle heat, from a glass retort into a receiver, perfectly effloresced acetate of lead with three-tenths of its weight of concentrated sulphuric acid; the materials being stirred immediately with a glass rod, in order that they may be thoroughly mixed. Acetic acid, obtained in this way, has always the odour of sulphurous acid, from which it may be freed by the addition of a small portion of peroxide (brown oxide) of lead. This converts the sulphurous into sulphuric acid, which immediately combines with the lead reduced to protoxide, and forms a sulphate, insoluble in the acetic acid. Another method for obtaining this acid, adopted in the Paris Codex, is by the destructive distillation of the acetate of copper (crystals of Venus). The distillation must be performed in a stoneware retort, and is described in detail by Thenard. The water of crystallization of the salt being evaporated before the acid begins to rise, there is a deficiency of the former liquid, necessary to hold the elements of the acetic acid together. Accordingly, a part of the acid is decomposed, being resolved into water, and a peculiar volatile compound called *pyroacetic spirit*, which gives to the acid product a peculiar fragrant smell. The sp. gr. of the acid thus obtained is 1.075. Both the methods for obtaining acetic acid, last described, are liable to the objection that the acid produced is apt to contain metallic matter; and hence the acid, when thus procured, is generally directed to be purified by a new distillation. But even after this step, some doubt may be entertained as to its entire safety for medicinal employment.

Properties. The acetic acid of the Pharmacopœias is a limpid and colourless liquid, possessing a very sour and acrid taste, and a fragrant pungent smell. It unites in all proportions with water, and dissolves to a certain extent in alcohol. It possesses the property of dissolving a number o substances, such as the volatile oils, camphor, gluten, resins and gum-resins. fibrin, albumen, &c. When well prepared, it should not form a precipitat with the soluble salts of baryta, and should evaporate completely in a glas or platinum capsule, without leaving any residue. The presence of copper lead, or tin, may be detected by neutralizing the acid with ammonia, an testing successively with ferrocyanate of potassa, sulphate of soda, and sulphuretted hydrogen, in the manner explained under *Acetum Destillatum* This acid consists of the strongest liquid acetic acid (radical vinegar) dilute with a variable quantity of water. The acid of the United States Pharmacopœia contains about 50 per cent. of water of dilution; that of the Dubli College, about 34 per cent. In this estimation, the water in a state of combination in the radical vinegar, and which is essential to its existence in th liquid state, is not included. Admitting 50 per cent. of water of dilutio in the U.S. acid, it would contain 42.5 per cent. of absolute or dry acetic acid.

Acetic acid as concentrated as possible, or *radical vinegar*, is a colourless liquid at the temperature of 60°, possessing a strongly acid and corrosive taste, and an acid, pungent, and refreshing smell. At the temperature of 55° it becomes a crystalline solid. Its sp. gr. is 1.063. In the state here described, it consists of one equiv. of dry acid 51.48, and one of water 9 = 60.48. When diluted with water, its density increases until it reaches 1.079, when its sp. gr. is at the maximum, after which further dilution renders it lighter. This statement shows that specific gravity is not an accurate test of the strength of this acid; but as the ordinary samples of the acid are not likely to be deficient in density from extreme concentration, they may without risk of error be estimated as stronger in proportion as this is greater. The best means, however, of determining the strength of the acid, is by ascertaining its saturating power, as this method is not liable to ambiguity. This acid is one of the few vegetable acids that volatilize without decomposition. Its boiling point is somewhat higher than that of water. When boiled in open vessels, it takes fire and burns with a blue flame like alcohol. As it attracts humidity from the atmosphere, it should be preserved in well stopped bottles. Its combinations with salifiable bases are called acetates. It consists, as a dry acid, of three equivalents of hydrogen 3, four of carbon 24.48, and three of oxygen 24 = 51.48.

Medical Properties and Uses. Acetic acid acts as a stimulant and rubefacient. Owing to its volatility and pungency, its vapour is frequently applied to the nostrils as an excitant in syncope, asphyxia, and headach. When employed in this manner, it is generally added to a small portion of sulphate of potassa, so as to moisten the salt, and the mixture is put in small glass bottles with ground stoppers. As a rubefacient it operates with considerable activity, producing burning heat and much redness and inflammation, which terminates by the peeling off of the cuticle. It is sometimes employed as a substitute for a fly blister, where the speedy production of a counter-irritant impression is desired, as for example, in croup, sorethroat, and other cases of internal inflammation. It may be applied by means of blotting paper or cambric moistened with the acid. It is also a good application to warts and corns, the vitality of which it frequently destroys.

Off. Prep. Acidum Aceticum Camphoratum, *Ed.*, *Dub.*; Acidum Aceticum Dilutum, *U.S.*; Morphiæ Acetas, *U.S.* B.

ACIDUM ACETICUM DILUTUM. *U.S. Diluted Acetic Acid.*

"Take of Acetic Acid *half a pint*; Distilled Water *five pints*. Mix them."

The acid resulting from the above formula is peculiar to the United States Pharmacopœia; but, unfortunately, the name by which it is designated is applied by the London College to distilled vinegar. The object of having this preparation, is to possess a weak solution of pure acetic acid, which may be substituted for distilled vinegar in all formulæ in which nicety is required. Distilled vinegar contains a portion of mucilage, which is always darkened or precipitated when this acid is saturated with an alkali, an occurrence which cannot take place when the dilute acetic acid of our Pharmacopœia is employed. As the *Acidum Aceticum* (U.S.) contains 42.5 per cent. of dry acid, it is easily determined by a calculation that the *Diluted Acetic Acid* will contain 3.86 per cent. of the same acid, which is about the average strength of distilled vinegar as ascertained by Mr. Phillips.

Off. Prep. Liquor Ammoniæ Acetatis, *U.S.* B.

ACIDUM BENZOICUM. *U. S., Lond., Ed., Dub.* *Benzoic Acid.*

"Take of Benzoin *any quantity.* Put the Benzoin into a glass vessel placed in a sand-bath; and with a heat of 300° gradually increased, sublime until nothing more ascends. Wrap the sublimed matter in bibulous paper, and press it, that it may be separated from the oily part; then again sublime with a heat not exceeding 400°." *U.S.*

This process is identical with that of the *London* Pharmacopœia, from which it was adopted.

The *Edinburgh* College gives the following. *Two pounds* of benzoin, previously triturated with *eight ounces* of carbonate of soda, are boiled in *sixteen pounds* of water, with constant agitation, for half an hour. The decoction is then strained; and the residue of the benzoin is boiled with other *six pounds* of water, which are also strained. The decoctions are mixed, and evaporated to two pounds. The remaining liquid is filtered, and diluted sulphuric acid dropped into it so long as any precipitate is afforded. The precipitated benzoic acid is dissolved in boiling water; and the solution while still hot is strained through linen, and set aside to crystallize. The process is completed by washing the crystals with cold water, and drying them.

According to the *Dublin* process, *five parts* of benzoin, triturated with *one part* of fresh quicklime, are boiled in *one hundred and thirty parts* of water for half an hour, the mixture being constantly stirred with a rod. After having cooled, the clear liquor is decanted, and the residue is boiled with *seventy parts* of water, which is also decanted when cold. The liquors having been mixed are evaporated to one-half, and filtered through paper; and *one part* of muriatic acid is gradually added. The precipitate produced is separated from the supernatant liquid, washed with a small quantity of cold water, dried with a gentle heat, and submitted to sublimation in a proper apparatus.

Of the above processes, the first is most simple and easy. The acid, which exists in the benzoin combined with resin, is volatilized by the heat, and condensed in the upper part of the apparatus. Unless the temperature is very carefully regulated, a portion of the resin is decomposed, and an oily substance generated, which rises with the acid and gives it a brown colour, from which it cannot be entirely freed by bibulous paper; and this result sometimes takes place even with the greatest caution. The process for subliming benzoic acid is usually conducted in a glazed earthen vessel, surmounted by a cone of paper, or by another vessel with a small opening at top, and a band of paper pasted round the place of junction. After the heat has been applied for an hour, the process should be suspended till the condensed acid is removed from the upper vessel or paper cone, when it may be renewed, and the acid again removed, and thus alternately till coloured vapours rise. The remaining acid of the benzoin may be extracted if deemed advisable, by treating the balsam with lime or carbonate of soda. From this mode of preparing benzoic acid it was formerly called *flowers of benzoin*.

By the Edinburgh and Dublin processes, the acid is extracted from the benzoin by combining it with a salifiable base, and is subsequently precipitated by an acid. It is purified, in the one case, by dissolving it in boiling water, which throws it down upon cooling; in the other, by sublimation, which gives it the peculiar silky lustre which distinguishes it. The process of the Dublin College is essentially that of Scheele, the process of the Edinburgh College that of Gren. They both afford a purer product than that obtained by sublimation, but not preferable in a medicinal point of view, as the small quantity of oil present in the sublimed acid adds to its stimulant properties, and at the same time renders it pleasant to the smell.

Several other modes of extracting the acid have been recommended by different chemists. The following is the process of Stolze. One part of the balsam is dissolved in three parts of alcohol, the solution filtered and introduced into a retort, and the acid saturated by carbonate of soda dissolved in a mixture of eight parts of water and three of alcohol. The alcohol is distilled off; and the benzoate of soda contained in the residuary liquid is decomposed by sulphuric acid, which precipitates the benzoic acid. This is purified by solution in boiling water, which lets fall the acid when it cools.

By the above process Stolze obtained 18 per cent. of acid from benzoin containing 19.425 per cent. By the process of Scheele (that of the Dublin College) he obtained 13.5 per cent.; by the agency of carbonate of soda, as in the Edinburgh process, 12 per cent.; by sublimation only 7.6 per cent. Nevertheless Mr. Brande says that the last process is on the whole the most economical. According to this author, good benzoin affords by sublimation from 10 to 12 per cent. of the acid contaminated with empyreumatic oil, and about 9 per cent. of the purified acid.

Properties. Sublimed benzoic acid is in soft, white, feathery crystals, of a silky lustre, and not pulverulent. From solution the acid crystallizes in transparent prisms. When quite pure it is inodorous; but prepared by sublimation from the balsam, it has a peculiar agreeable aromatic odour, dependent on the presence of an oil, which may be separated by dissolving the acid in alcohol, and precipitating it with water. Its taste is warm, acrid, and acidulous. It is unalterable in the air, but at 230° melts, and at a somewhat higher temperature rises in suffocating vapours. It is inflammable, burning without residue. It is very sparingly soluble in cold, but is dissolved by about twenty-four parts of boiling water. It is soluble in alcohol, and in concentrated sulphuric and nitric acids, from which it is precipitated by water. The fixed oils also dissolve it. Its solution reddens litmus paper, and it forms salts with salifiable bases; but its acid properties are not powerful. According to Berzelius, in consists of 75.36 parts of carbon, 4.92 of hydrogen, and 19.72 of oxygen in the hundred. It is a characteristic constituent of the balsams, and has been found in various other vegetable, and in some animal products.

Medical Properties and Uses. Benzoic acid is stimulant, and has been thought to be expectorant; but is not now used internally except as a constituent of one or two officinal preparations. The dose is from 10 to 30 grains. It is an ingredient in some cosmetic washes, and has been employed by way of fumigation as a remedy in affections of the skin.

Off. Prep. Tinctura Opii Ammoniata, *Ed.;* Tinctura Opii Camphorata, *U.S., Lond., Ed., Dub.* W.

ACIDUM HYDROCYANICUM. *U.S.* ACIDUM PRUSSICUM. *Dub.* *Hydrocyanic Acid. Prussic Acid.*

"Take of Cyanuret of Mercury *an ounce*; Distilled Water *eight fluidounces and a half;* Carbonate of Lead *a sufficient quantity*. Dissolve the Cyanuret of Mercury, with a gentle heat, in the Distilled Water; pass Hydrosulphuric Acid through the solution, in a proper vessel, till it is fully saturated; then filter through paper. To the filtered liquor add a quantity of Carbonate of Lead more than sufficient to saturate any excess of Hydrosulphuric Acid, and agitate them well together. Lastly, again filter through paper.

"The Hydrocyanic Acid prepared by this process, is of the same density with that of Scheele.

"Hydrosulphuric Acid is obtained from the Sulphuret of Iron, and Sulphuric Acid diluted with four times its weight of water." *U.S.*

"Take of Cyanuret of Mercury *an ounce;* Muriatic Acid *seven fluidrachms;* Water *eight fluidounces.* From a glass retort, distil into a refrigerated receiver, *eight fluidounces*, to be kept in a well stopped bottle, in a cool and dark place. The specific gravity of this acid is 0.998." *Dub.*

Hydrocyanic or prussic acid was first brought into general notice as a remedy by Magendie in 1817. It was admitted as an officinal article into the Paris Codex in 1818, into the first edition of the United States Pharmacopœia in 1820, and into the revised edition of the Dublin Pharmacopœia in 1826. As yet it has not been recognised by the London or Edinburgh College.

The process of the *United States* Pharmacopœia of 1820 for obtaining the acid, was that of Scheele; but as this process produced an acid of variable strength, it was thought advisable, in the revision of 1830, to substitute the process of Proust, (generally attributed to Vauquelin,) as laid down in the Paris Codex. By this process the cyanuret (bicyanuret) of mercury, in solution of definite strength, is decomposed by a stream of hydrosulphuric acid gas (sulphuretted hydrogen.) The proportions for mutual decomposition, are one equiv. of the bicyanuret, and two of hydrosulphuric acid. Two equiv. of hydrogen from the acid, combine with the two equiv. of cyanogen in the bicyanuret, forming two equiv. of hydrocyanic acid which dissolve in the water; while the two equiv. of sulphur form with the one equiv. of mercury, one equiv. of bisulphuret of mercury, or cinnabar, which precipitates. Filtration would now complete the process, were it not that the filtered solution is apt to retain a little hydrosulphuric acid. To remove this, an excess of carbonate of lead is added, which converts it into insoluble sulphuret of lead. By a new filtration, the sulphuret, as well as any excess of carbonate of lead, is removed, and the clear liquor consists of hydrocyanic acid, diluted to a certain extent with water.

The process of the U.S. Pharmacopœia is liable to the objection, that the acid product is apt to contain a little oxide of lead, even after the most careful filtration. This may arise from the presence of some oxide in the carbonate of lead employed; or possibly the hydrocyanic acid may decompose a small portion of the carbonate itself. To obviate this objection to the process, it would, perhaps, be an improvement, if the acid, as obtained by the officinal directions, were submitted to distillation, which would effectually free it from the impurity in question.

The *Dublin* process is that of Gay-Lussac, with the use of a certain amount of water of dilution. The rationale is precisely similar to that just given, the chlorine of the muriatic acid in this process performing exactly the same part as the sulphur in the other. Consequently the residue here is the bichloride of mercury, or corrosive sublimate. The Dublin College uses a little more than the equivalent quantity of muriatic acid, to ensure the complete decomposition of the bicyanuret.

The process adopted in the United States Pharmacopœia is preferable to that of the Dublin College, on account of its greater facility and productiveness. The acid obtained is stated to be equivalent in strength to that procured by Scheele's process; but this statement is not very definite, as we have already mentioned that Scheele's process gives an acid of variable strength. To remove uncertainty on this point, we have had the process of the United States Pharmacopœia repeated, and the acid obtained is found to have the sp. gr. 0.998 at the temperature of 60°, which is the same density as that of the Dublin acid. That made at Apothecaries' Hall, London, weighs 0.995. The process pursued at this establishment is to put a pound of bicyanuret of mercury into a tubulated retort with six pints of water, and a pound of muriatic acid of the sp. gr. 1.15. A capacious receiver is luted on and six pints are distilled over.

The Paris Codex gives three processes for obtaining hydrocyanic acid; namely, Proust's (Vauquelin's), Robiquet's, and Scheele's. The first of these is that adopted in the United States Pharmacopœia, and has already been explained. The second is essentially the same as that of the Dublin College, differing only in the details. The first step of it is to distil the bicyanuret with strong muriatic acid, whereby the concentrated acid of Gay-Lussac, weighing 0.700, is obtained, which is then mixed with twice* its weight of distilled water. Thus diluted, it has the sp. gr. 0.900. Scheele's process, as given in the Codex, is as follows:—128 parts of ferrocyanate of iron (Prussian blue) and 64 parts of red oxide of mercury are boiled with 500 parts of distilled water for fifteen minutes, the mixture being constantly stirred. The whole is then filtered, and the insoluble residue washed with 128 parts of boiling distilled water. The filtered liquors are then mixed, and to these are added, 96 parts of finely levigated iron filings, and 24 parts of sulphuric acid, previously diluted with 24 parts of distilled water. The whole is stirred, and afterwards allowed to remain at rest for an hour, (the vessel being immersed in cold water,) in order that the insoluble matter may subside. The clear solution is then subjected to distillation, and 192 parts drawn off. The distilled product is next mixed with 8 parts of carbonate of lime, and redistilled, 128 parts only being drawn off. In this process, the boiling together of Prussian blue and peroxide of mercury generates the bicyanuret of mercury. (See *Hydrargyri Cyanuretum.*) When this solution is mixed with diluted sulphuric acid and iron filings, water is decomposed; its oxygen converts the iron into protoxide, which combines with the sulphuric acid to form sulphate of iron, while its hydrogen combining with the cyanogen, generates hydrocyanic acid. In the meantime the mercury is thrown down in the metallic state. The clear solution, therefore, contains sulphate of iron and hydrocyanic acid, the latter of which alone comes over when the liquid is distilled. The object of the second distillation from chalk, is to free the acid from colour.

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* The Paris Codex says an equal weight of distilled water; but this is an error, as Robiquet's formula directed Gay-Lussac's acid to be diluted with twice its weight of water. But even when diluted to this extent, the acid is much stronger than it would be safe to use as a medicine. Gay-Lussac's acid being anhydrous, the acid proposed by Robiquet would contain thirty-three and one-third per cent. of real acid! The acid obtained by the use of sulphuretted hydrogen in the Codex, is much weaker than Robiquet's; but is nevertheless alleged to be of the same strength. The apothecaries of Paris, aware of the dangerous strength of the acid of the Codex (Robiquet's,) are in the habit of putting up in prescriptions, an acid prepared with one part of Gay-Lussac's acid to forty parts of water, which gives a preparation containing 2.4 per cent. of real acid. On account of the difference in strength of different samples of medicinal hydrocyanic acid and its liability to decomposition, Messrs. Robiquet and Villermé have proposed to substitute for it the *cyanuret of potassium*, which is a permanent compound, not liable to change. It is made by exposing ferrocyanate of potassa to a long continued red heat in a crucible; whereby the ferrocyanic acid is decomposed, and a dark mass remains, consisting of cyanuret of potassium mixed with charcoal and iron. From this mass the cyanuret may be dissolved, and the solution, when evaporated to dryness, furnishes the substance in the solid state. It should be kept in this state; as it is liable to undergo decomposition when dissolved. The dose is one quarter of a grain, to be gradually increased to a grain. It should be given in solution.

The processes above given are intended to furnish a *dilute* hydrocyanic acid for medicinal purposes. The methods of obtaining the *anhydrous* or *pure* acid are somewhat different. Vauquelin's process is to pass a current of hydrosulphuric acid gas over the bicyanuret of mercury contained in a glass tube, connected with a refrigerated receiver. The first third only of the tube is filled with the bicyanuret; the remaining two-thirds being filled, half with carbonate of lead, and half with chloride of calcium. This process is precisely similar to Proust's, only performed in the dry way. The hydrocyanic acid being generated in the first third of the tube, is driven forward by a gentle heat into the refrigerated receiver. By passing through the carbonate of lead and chloride of calcium, it is successively freed from any traces of hydrosulphuric acid and of water which it may contain. Gay-Lussac's process, already alluded to, consists in distilling the bicyanuret with *strong* muriatic acid into a refrigerated receiver. Between the retort and receiver is interposed a tube filled, one half with fragments of marble and the rest with chloride of calcium. The distilled acid, by passing through these, is purified from muriatic acid and water, and condenses in the cooled receiver in the anhydrous state. The rationale of this process has already been given. The residue in the retort is of course corrosive sublimate. Another process for the anhydrous acid, less expensive than the above, is that of Gautier, the details of which are thus given by Berzelius. The ferrocyanate of potassa is fused without access of air, whereby it is converted into a mixture of cyanuret of potassium and carburet of iron. The mass obtained, after being pulverized and placed in a flask, is slightly moistened with water, and acted on with muriatic acid, added by small portions at a time. The flask is then plunged into hot water, which causes the hydrocyanic acid to be disengaged in the form of vapour. This is passed through a tube containing chloride of calcium, and finally received in a small flask, kept cold by a freezing mixture, where it is condensed. Berzelius inclines to give the preference to this process over all others for obtaining the anhydrous acid; as the salt employed is cheap, and as the temperature of the hot water, while it is competent to volatilize the hydrocyanic acid, is not sufficient to drive over any muriatic acid.

Properties of the Medicinal Acid. Hydrocyanic acid, in the dilute state in which it is used in medicine, is a transparent, colourless, somewhat volatile liquid, possessing a taste at first cooling, afterwards somewhat irritating, and a smell resembling that of bitter almonds. It is liable to undergo decomposition if exposed to the light; but is easily kept if the bottle containing it is covered with black paint, or black paper. Its most usual impurities are sulphuric and muriatic acids; the former of which may be detected by evaporating a small portion of the suspected acid, when this impurity will remain; and the latter by saturating with ammonia, and exposing the liquid to a temperature not exceeding 212°, when the hydrocyanate of ammonia will be dissipated, and muriate of ammonia left. If lead be present, it may be detected by means of hydrosulphuric acid gas, which will cause a blackish precipitate. It is incompatible in prescriptions with nitrate of silver, the salts of iron and copper, and most of the salts of mercury. The medicinal acid is of different strengths, as ordered by different pharmaceutical authorities; its particular strength being denoted by the specific gravity, which is always lower in proportion as it is stronger. The taking of the specific gravity, however, is not a mode of determining the strength, which is convenient for the majority of apothecaries; as slight differences in density indicate very material differences in strength. It is on this account that Dr. Ure has proposed another method, which consists in ascertaining the quantity of red oxide of mercury which a given weight of the acid will dissolve. In applying this test, any convenient weight of the acid, for example one hundred grains, are to be taken, and forty or fifty grains of the mercurial oxide, well pulverized and dried, are weighed out. The latter is then to be added to the former, by small portions at a time, as long as it is dissolved; the solution being assisted by agitation. What remains of the oxide unexpended, deducted from the whole quantity weighed out, will give the portion dissolved. The equivalent quantities of oxide and acid for mutual decomposition, are one equiv. of the former 218, to two of the latter 54.78; as these proportions contain the proper quantities of mercury and cyanogen to form a bicyanuret. Consequently, the oxide dissolved will be to the anhydrous acid present, as 218 to 54.78, or as 4 to 1 nearly. Hence we have the simple rule of dividing the weight of oxide dissolved by 4, and the quotient will represent, with sufficient precision, the quantity of anhydrous acid present. The strength of the medicinal acid may also be ascertained by nitrate of silver, which forms a precipitate, every 134.39 parts of which indicate 27.39 of real acid. Both these tests, however, are inapplicable, if the hydrocyanic acid contains muriatic acid. The strength of the different medicinal acids, expressed by indicating the percentage of anhydrous acid, varies considerably. Thus the acid of the United States Pharmacopœia, assuming its sp. gr. to be 0.998, contains 1.6 per cent. of real acid, and the Dublin acid has the same strength. That of Apothecaries' Hall contains as much as 3.2 per cent. of real acid.

Properties of the Anhydrous Acid. Hydrocyanic acid, perfectly free from water, is a colourless, transparent, inflammable liquid, of extreme volatility, boiling at 80°, and congealing at 5°. Its sp. gr. as a liquid is 0.6969, at the temperature of 64°; and as a vapour 0.9423. Its taste is at first cooling, afterwards burning, with an after-taste in the throat like that of bitter almonds; but from its extremely poisonous nature, it must be tasted with the utmost caution. Its odour is so strong as to produce immediate headach and giddiness. Both water and alcohol dissolve it readily. It is much more prone to undergo decomposition than the dilute acid. In the course of a few hours it sometimes begins to assume a reddish-brown colour, which becomes gradually deeper, till at length the acid is converted into a black liquid, which exhales a strong smell of ammonia. It is a very weak acid in its chemical relations, and reddens litmus but slightly. With salifiable bases it forms salts called hydrocyanates, which are very liable to undergo decomposition. Though usually a product of art, it exists in nature in the cherry-laurel, bitter almond, bird-cherry, peach, and some other plants.

Composition, &c. Hydrocyanic acid consists of one equiv. of cyanogen 26.39, and one of hydrogen 1=27.39; or in volumes, of one volume of cyanogen and one volume of hydrogen without condensation. *Cyanogen* is a colourless gas, of a strong and penetrating smell, inflammable, and burning with a beautiful bluish-purple flame. Its sp. gr. is 1.8157. It was discovered in 1815, by Gay-Lussac, who considers it a compound radical, which, when acidified by hydrogen, becomes hydrocyanic acid. It consists of two equiv. of carbon 12.24, and one of nitrogen 14.15=26.39; or in volumes, of two volumes of the vapour of carbon, and one volume of nitrogen, condensed into one volume. The ultimate constituents of hydrocyanic acid are, therefore, two equiv. of carbon, one of nitrogen, and one of hydrogen.

Hydrocyanic acid, in a dilute state, was discovered in 1780 by Scheele, who correctly stated its constituents to be carbon, nitrogen, and hydrogen; but the peculiar way in which they are combined was first demonstrated by Gay-Lussac, by whom also the anhydrous acid was first obtained.

Medical and Toxicological Properties. Hydrocyanic acid is the most deadly poison known, proving, in many cases, almost instantaneously fatal. One or two drops of the pure acid are sufficient to kill a vigorous dog in a few seconds. After death no trace of irritability can be detected in the muscles. Notwithstanding its tremendous energy as a poison, it has been ventured upon in a dilute state as a medicine. Though occasionally resorted to as a remedy previously to 1817, it did not attract much attention until that year, when Magendie published his observations on its use in diseases of the chest, and recommended its employment to the profession. Its medical virtues are those of a powerful sedative, and, accordingly, it has been used in diseases attended with irritation and pain. It has been most highly recommended and extensively used in complaints of the respiratory organs. It is supposed to exert a control over pulmonary inflammation, after the first edge of excitement has been taken off by blood-letting, and no doubt, in many instances, has been found beneficial under such circumstances. In tuberculous phthisis, though at one time boasted of as a remedy, it has no power whatever, except as a palliative for the cough. In the various affections of the chest, however, attended with dyspnœa or cough, such as asthma, hooping cough, and chronic catarrh, its use has often been decidedly beneficial, by allaying irritation or relaxing spasm. In hypertrophy of the heart, and aneurism of the aorta, it has also been used with advantage. In various affections of the stomach, attended with pain and imperfect digestion, hydrocyanic acid, conjoined with tonics, has proved beneficial in the hands of some practitioners. Sometimes it is used externally, diluted with water, as a wash in cutaneous diseases. Dr. A. T. Thomson, from his personal experience, insists particularly on its efficacy in allaying the itching and tingling in impetiginous affections.

The dose of medicinal hydrocyanic acid is from one to six or eight drops dissolved in distilled water, or rubbed up with mucilage of gum Arabic or almond emulsion. It requires to be administered with the greatest caution, on account of the minuteness of the dose, and the great variableness in strength of the acid as found in the shops. The proper plan, therefore, is to begin with a small dose, one drop for example, and gradually to increase the dose, until some obvious impression is produced. If giddiness, weight at the top of the head, sense of tightness of the stomach, or faintness, come on, its use should be discontinued. In all cases in which a fresh portion of medicine is used, the dose should be lowered to the minimum, for fear the new sample might prove stronger than that previously employed. When resorted to as a lotion, from thirty minims to a fluidrachm may be mixed with a fluidounce of distilled water.

Hydrocyanic acid is so rapidly fatal as a poison, that physicians have seldom to treat its effects. When not immediately fatal, the symptoms produced are sudden loss of sense, trismus, difficult and rattling respiration, coldness of the extremities, a smell of bitter almonds proceeding from the mouth, smallness of the pulse, swelling of the neck, dilatation and immobility of the pupil, convulsions, &c. The first measure to be taken in the treatment is the administration of a strong emetic, if the practitioner be called immediately, otherwise a purgative enema. Next frictions with tincture of cantharides and ammonia, sinapisms to the feet, and mucilaginous drinks are to be employed. In case of cerebral congestion, bleeding from the jugular, or leeching behind the ears, will be proper. As a stimulant, a teaspoonful of oil of turpentine may be given from time to time with advantage. Diluted water of ammonia, mentioned by some authorities as an antidote, is not, according to Orfila, entitled to that appellation. Berzelius, however, considers it the best counterpoison, which we possess against this acid.

After death from suspected poison, it is sometimes necessary, in medico-legal investigations, to ascertain whether the event was caused by this acid. Lassaigne has indicated, as a very delicate test, the use of sulphate of copper. The stomach should be cut up, and, with its contents, mixed with a small quantity of water, and the mixture submitted to distillation. When about an eighth of the water has come over, a drop of caustic potassa is added to it, and immediately afterwards, a small quantity of the sulphate of copper. The alkali will cause a precipitate of peroxide of copper; but if hydrocyanic acid be present, a cyanuret of copper will also be formed. To ascertain the presence of the latter, one or two drops of muriatic acid are to be added, which will dissolve the peroxide of copper, and leave the cyanuret diffused through the liquid, so as to give it a milky appearance. B.

ACIDUM MURIATICUM DILUTUM. *Dub.* *Diluted Muriatic Acid.*

"Take of Muriatic Acid, *by measure, ten parts.* Distilled Water, *by measure, eleven parts.* Mix. The specific gravity of this acid is 1.080." *Dub.*

This preparation, which is peculiar to the Dublin College, contains about sixteen per cent. of real acid. It is more convenient for exhibition than the strong acid; and its introduction may, therefore, be viewed as an improvement. For an account of its medical properties the reader is referred to the article *Acidum Muriaticum.* Its dose is from ten to fifty drops, mixed with water or other convenient vehicle. It is employed by the Dublin College in the preparation of the *Calcis Phosphas Præcipitatum.* B.

ACIDUM NITRICUM DILUTUM. *Lond., Dub.* ACIDUM NITROSUM DILUTUM. *Ed.* *Diluted Nitric Acid.*

"Take of Nitric Acid *a fluidounce;* Distilled Water *nine fluidounces.* Mix." *Lond.*

"Take of Nitric Acid, *by measure, three parts;* Distilled Water, *by measure, four parts.* Mix, avoiding the noxious vapours. The specific gravity of this acid is 1.280." *Dub.*

"Take of Nitrous Acid and of Water *equal weights.* Mix them, taking care to avoid the noxious vapours." *Ed.*

These formulæ are intended to furnish a nitric acid of convenient strength for medical use. The U. S. Pharmacopœia has no corresponding preparation. The British Colleges do not agree in the strength which they direct for it. The acid of the London College contains 14.2 per cent. of strong nitric acid, and has a sp. gr. of 1.08; that of the Dublin College contains nearly 48 per cent., and that of the Edinburgh, 50 per cent. The acid, therefore, of the Dublin and Edinburgh Colleges is more than three times as strong as that of the London Pharmacopœia. These discrepancies are to be regretted; but we incline to the opinion that the strength of the London acid is the most convenient. The formula of the Edinburgh College would seem to give a diluted nitrous, instead of nitric acid; but the fact is, that the nitric oxide, the presence of which forms the essential character of the pharmaceutical nitrous acid, is extricated during the dilution.

The medical properties of the diluted acid are the same as those of the strong acid. (See *Acidum Nitricum.*) The dose of the London acid is from twenty to forty drops three times a day; that of the other Colleges, one-third this quantity. It is employed pharmaceutically by the Edinburgh and Dublin Colleges in preparing the nitrate of silver, subnitrate of bismuth, red precipitate, acetate of mercury, and precipitated calomel. B.

ACIDUM NITROMURIATICUM. *Dub.* *Nitromuriatic Acid.*

"Take of Nitric Acid, *by measure, one part;* Muriatic Acid, *by measure, two parts.* Mix the Acids in a refrigerated vessel, and keep the mixture in a well stopped bottle, in a cool and dark place." *Dub.*

This is the *aqua regia* of the earlier chemists, so called from its property of dissolving gold. Nitric and muriatic acids, when mixed together, mutually decompose each other. The equivalent quantities, necessary to render the decomposition complete, are one equiv. of each. One equiv. of hydrogen of the muriatic acid forms water with one equiv. of oxygen of the nitric acid, which consequently becomes reduced to the state of nitrous acid, and chlorine is set free. The preparation, therefore, after the reaction has taken place, consists of a solution of nitrous acid and chlorine in water.

As the acids, considered dry, must be used in the proportion of their equivalents, it is easy to calculate in what proportions the officinal acids of the U. S. Pharmacopœia must be mixed, so as to contain equivalent quantities of the dry acids. Thus 67.7 parts of the U.S. nitric acid contain one equiv. of dry acid; and 114.4 parts of the U.S. muriatic acid, one equiv. of dry acid also. It hence follows that the U.S officinal acids, for complete decomposition, must be mixed in the proportion of 67.7 parts by weight of nitric acid to 114.4 of muriatic acid, or of 10 to 17 nearly; and the mixture will contain by calculation somewhat less than 20 per cent. of free chlorine, assuming that none is lost by effervescence. As the Dublin and U.S. officinal muriatic acids coincide in sp. gr., and their nitric acids differ in sp. gr. only as 1.49 to 1.5, the above calculations are virtually applicable to the Dublin acids. And by a calculation, it may be easily determined, that the proportion given in the Dublin formula of one measure of nitric acid to two of muriatic is, theoretically, nearly correct, being in weight as 10 to 16 nearly; which numbers give a slight excess of the nitric acid, an error on the right side, as it ensures the total decomposition of the muriatic acid.

The affinity of chlorine and nitrous acid for water being much less than that of muriatic and nitric acid for the same liquid, the mixture of the *strong acids* is always attended with the production of effervescence; and great care should be taken to preserve the nitromuriatic acid, thus formed, in strong vessels, and in a cool, dark place. To prevent the loss of chlorine, Dr. Duncan recommends the immediate dilution of the mixture with an equal quantity of water. On account of these objections to the use of the strong acids, it is best to employ good *ordinary acids* of commerce. The strength of these may be stated as averaging 1.15 for muriatic, and 1.34 for nitric acid; and the proportions in which they should be mixed is about 26 parts by weight of the former to 25 of the latter. The mixture contains about 15 per cent of chlorine. The decomposition, in this case, takes place slowly, and the resulting solution of chlorine may be kept with perfect safety.

Properties. Nitromuriatic acid has a golden-yellow colour, and emits the smell of chlorine. It requires to be kept in a cool, dark place, on account of its liability to lose its chlorine by heat, or to have it converted, by the action of light, into muriatic acid, in consequence of the decomposition of water. The nitric and muriatic acids, as occasionally sold in the shops, are so weak that when mixed they will not readily act on gold-leaf. When this is the case, their solvent power may be rendered effective by the addition of a little sulphuric acid, which, by its superior attraction for water, concentrates the others, and produces an immediate action, accompanied by the evolution of chlorine.

Medical Properties and Uses. Nitromuriatic acid has been introduced into the Dublin Pharmacopœia, probably on account of the favourable report of its efficacy as an external remedy in hepatitis, made by Dr. Scott of Bombay. When thus employed, it produces a tingling sensation of the skin, thirst, and a peculiar taste in the mouth; and at the same time stimulates the liver, as is evinced by an increased flow of bile. It is used either by sponging, or in the form of bath. When applied in the former way, the acid is first diluted so as to have the acidity of strong vinegar. When used as a bath, three gallons of water contained in a deep narrow tub, may be acidulated with six fluidounces of the acid. In this the feet and legs are to be immersed for twenty minutes or half an hour. The bath may be employed at first daily, and afterwards thrice or twice a week; and the sponging may be used at the same time. The acid may be used also internally. The dose in this case is two or three drops, sufficiently diluted with water.*

B.

ACIDUM SUCCINICUM. *Ed., Dub. Succinic Acid.*

"Take of Amber reduced to powder, and of Sand, *equal parts.* Mix them, and put the mixture in a glass retort, of such a size as to be only half filled by it. Then adapt a receiver, and distil, by means of a sand-bath, with a fire gradually increased. At first a watery liquor will come over, with a little yellow oil; then a yellow oil with an acid salt; and lastly, a reddish and black oil. Pour the liquor out of the receiver, and separate the oil from the water. Press the Succinic Acid, collected from the neck of the retort and sides of the receiver, between folds of blotting paper, to free it from adhering oil; then purify it by solution in warm water, and crystallization." *Ed.*

"Take of Amber reduced to coarse powder, and of pure Sand, each *one part.* On the application of heat gradually increased, an acid liquor, an oil, and the acid in the crystallized form will distil over. The latter should be received on bibulous paper, and exposed to a strong pressure to expel the oil, and again sublimed. By filtration through bibulous paper, the oil may be obtained separate from the acid liquor." *Dub.*

The above formulæ have for their object to obtain the oil of amber, as well as succinic acid; but our remarks will be confined in this place, to the acid, the oil being described under another head. (See *Oleum Succini.*) Amber contains succinic acid united with a peculiar oily matter. When distilled, it swells considerably, and a slightly coloured liquid first comes over; after which the succinic acid sublimes, and condenses in needles in the neck of the retort and on the sides of the receiver. At last the matter suddenly ceases to swell, and the process is finished; for after this time, very little succinic acid is disengaged, but a thick and dark coloured oil rises, which renders the acid impure. The Colleges direct the admixture of sand, to prevent the inconvenience of the amber swelling too much by the heat.

Several processes have been proposed to purify succinic acid. The best is that of Morveau, which consists in dissolving the acid in twice its weight of nitric acid, and evaporating the solution to dryness. In this way the oil is decomposed, while the succinic acid remains unaltered. This is then washed in a little ice-cold water, next dissolved in boiling water, and crystallized.

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* For further information the reader is referred to the third volume of the Journ. of the Phil. College of Pharmacy, for a paper on nitromuriatic acid by Daniel B. Smith of Philadelphia, to whom we are indebted for the principal chemical facts and calculations contained in this article.

Properties. Succinic acid, when pure, is a white, transparent solid, crystallizing in prisms, and having a somewhat acrid taste. It reddens litmus strongly. Exposed to heat it melts, and above the boiling point of water is partly sublimed and partly decomposed. It dissolves in five times its weight of cold, and twice its weight of boiling water. It is soluble also in cold alcohol, and much more so in boiling alcohol. It consists of two equiv. of hydrogen 2, four of carbon 24.48, and three of oxygen 24=50.48. It differs, therefore, from acetic acid, only in containing one equiv. less of hydrogen.

Succinic acid is at present never used in medicine, and ought to be expunged from the Pharmacopœias. B.

ACIDUM SULPHURICUM AROMATICUM. *U. S.*, *Ed.*, *Dub.*

Aromatic Sulphuric Acid. Elixir of Vitriol.

"Take of Sulphuric Acid *three fluidounces and a half;* Ginger, bruised, *an ounce;* Cinnamon, bruised, *an ounce and a half;* Alcohol *two pints.* Drop the Acid gradually into the Alcohol, and digest in a close vessel for three days; then add the Ginger and Cinnamon, and macerate for a week; lastly, filter through paper." *U.S.*

"Take of Stronger Alcohol *two pounds* [Rectified Spirit *two pints*, *Dub.*]; Sulphuric Acid *six ounces.* Add the Acid gradually to the Alcohol. Digest the mixture with a very gentle heat, in a covered vessel, for three days, and then add Cinnamon Bark, bruised, *an ounce and a half;* Ginger Root, bruised, *an ounce.* Digest again in a covered vessel for six days, and then filter through paper placed in a glass funnel." *Ed.*

This valuable preparation, commonly called *elixir of vitriol*, is a simplification of the acid elixir of Mynsicht, and was adopted from the Edinburgh College, in the first United States Pharmacopœia, and afterwards by the Dublin College, in their revised edition of 1826. The only change in the Edinburgh formula, made by the United States Convention, is the substitution of the nearest equivalent measures for the weights of the liquid ingredients. In the Edinburgh directions, the acid is to the alcohol in weight as 1 to 4; in the United States Pharmacopœia (the measures being turned into weights), as 1 to 4.15, which is a sufficiently near coincidence for all practical purposes. The Dublin College has adopted the Edinburgh formula throughout, with the exception of substituting two pints of alcohol for two pounds; a change which renders the preparation considerably weaker in acid, as two pints of officinal alcohol weigh more than two pounds.

Properties. Aromatic sulphuric acid is a reddish-brown liquid, of a peculiar aromatic odour, and, when sufficiently diluted, of a grateful acid taste. It has been supposed by some to be a kind of ether, its main ingredients justifying such a suspicion; but the late Dr. Duncan, who originally held this opinion, satisfied himself that the alcohol and sulphuric acid, in the proportions here employed, do not produce a single particle of ether. It must, therefore, be viewed merely as sulphuric acid diluted with alcohol, and containing the essential oils of ginger and cinnamon.

Medical Properties and Uses. It is tonic and astringent, and affords the most agreeable mode of administering sulphuric acid. It is very much employed in debility with night sweats, in loss of appetite, and in the convalescence from fevers, especially those of the intermittent type. It is often given in conjunction with cinchona, the taste of which it serves to cover, and, by increasing the solubility of the febrifuge principles of the bark, appears to increase its efficacy. In hæmoptysis and other hemorrhages, when not attended with obvious inflammation, it frequently proves useful in stopping the flow of blood. The dose is from ten to thirty drops in a wineglassful of water, repeated two or three times a day. B.

ACIDUM SULPHURICUM DILUTUM. *U. S., Lond., Ed., Dub. Diluted Sulphuric Acid.*

"Take of Sulphuric Acid *a fluidounce;* Water *thirteen fluidounces.* Add the Acid gradually to the Water in a glass vessel, and mix them." *U.S.*

"Take of Sulphuric Acid *a fluidounce and a half;* Distilled Water *fourteen fluidounces and a half.* Add the Acid gradually to the Water, and mix them." *Lond.*

"Take of Sulphuric acid *one part;* Water *seven parts.* Mix them." *Ed.*

"Take of Pure Sulphuric Acid *one part;* Distilled Water *seven parts.* Gradually add the Acid to the Water. The specific gravity of this acid is 1.084." *Dub.*

This preparation is sulphuric acid diluted to such an extent as to make it convenient for medical use. The Edinburgh and Dublin Colleges agree in making the strong acid one-eighth part of the mixture; and in the U. States Pharmacopœia, these proportions are followed, as nearly as they can be approached in measures. The exact proportions of these Colleges, expressed in measures, would be 1 fluidounce of acid to 12.9 fluidounces of water, which is sufficiently near the proportion of 1 to 13, to justify the adoption of the latter numbers. There is accordingly a virtual agreement in the strength of the acid, by the three processes just mentioned; but unfortunately the formula of the London College gives an acid considerably stronger. The coincident processes afford an acid containing between 12 and 13 per cent. of the strong liquid acid; while the London acid contains 16 per cent. The strong acid is added gradually to the water, to guard against the too sudden production of heat, which might cause the fracture of the vessel. During the dilution, when commercial sulphuric acid is used, the liquid becomes slightly turbid, and in the course of a few days deposites a grayish-white powder, which is sulphate of lead, an impurity in the strong acid, not soluble in it after considerable dilution. This noxious salt is thus got rid of, but sulphate of potassa, another impurity in the strong acid, still remains in solution. To avoid these impurities, the Dublin College directs *pure* sulphuric acid and *distilled* water. This, however, would seem to be a useless refinement, as the sulphate of lead in the commercial acid is precipitated by dilution as above explained, and the presence of sulphate of potassa can do no harm.

Medical Properties and Uses. Diluted sulphuric acid is tonic, refrigerant, and astringent. It is given in low typhoid fevers, and often with advantage. In the convalescence from protracted fevers, it often acts beneficially as a tonic, exciting the appetite and promoting digestion. As an astringent, it is employed in colliquative sweats, passive hemorrhages, and diarrhœas dependent on a relaxed state of the mucous membrane of the intestines. Externally, it is used as an ingredient in gargles for ulcerated sore throat and for checking excessive ptyalism, and as a wash for cutaneous eruptions and ill-conditioned ulcers. The dose is from ten to thirty drops three times a day, in a wineglass or two of plain or sweetened water. It is added with advantage to infusions of cinchona, the organic alkalies of which it tends to hold in solution. As it is apt to injure the teeth, it is best taken by sucking it through a quill. It is much less used in the United States than the elixir of vitriol, which possesses nearly the same medical properties. (See *Acidum Sulphuricum* and *Acidum Sulphuricum Aromaticum.*)

This acid is employed as a chemical agent for preparing the benzoic and citric acids, and the precipitated sulphuret of antimony.

Off. Prep. Infusum Rosæ Compositum, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Morphiæ Sulphas, *U.S.;* Quininæ Sulphas, *Dub.;* Solutio Sulphatis Zinci, *Ed.* B.

ACIDUM SULPHURICUM PURUM. *Dub.* *Pure Sulphuric Acid.*

"Take of Commercial Sulphuric Acid *a pound.* Put the acid into a retort of flint glass, attach a receiver of the same kind, and with the junctures of the vessels left open, let heat be applied to the retort until one-twelfth part of the liquor shall have distilled over: this, as it contains water, should be rejected. The receiver being again applied, the residuum is to be distilled to dryness. A few slips of platinum put into the acid in the retort, will restrain the ebullition, which otherwise would be too violent. The specific gravity of this acid is 1.845. Let the acid be kept in well closed vessels." *Dub.*

The object of this process is to obtain a pure sulphuric acid. The commercial acid contains the sulphates of lead and potassa, amounting not unfrequently to three or four per cent.; and these salts, not being volatile, are effectually got rid of by distillation. The explanation of the several steps of the process for distilling this acid has been given under the head of *Acidum Sulphuricum*, p. 43, and need not be repeated here.

This preparation is peculiar to the Dublin College, and has been adopted in the late revision of their Pharmacopœia, to avoid the risk of introducing sulphate of lead into the preparations of sulphuric acid. But this acid is never used in a concentrated form; and in the dilute state in which it is employed, it always lets fall this metallic salt. Admitting, however, that there is some danger of metallic impurity from using the commercial acid, the Dublin College have committed the double error of omitting to use their pure acid, where on their principles it is necessary, and of employing it in formulæ in which it is not needed. The only officinal preparation of the *pure* acid is the *Acidum Sulphuricum Dilutum;* but it would seem equally required in the elixir of vitriol, where the commercial acid may be considered as directed. On the other hand, the diluted sulphuric acid is employed uselessly in the processes for citric acid and the precipitated sulphuret of antimony, where it acts merely as a chemical agent.

Off. Prep. Acidum Sulphuricum Dilutum. *Dub.* B.

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ÆTHEREA.

Ethers.

Ethers are peculiar, fragrant, sweetish, very volatile, and inflammable liquids, generated by the action of acids on alcohol. Their composition varies with the acid employed in their formation. Sometimes this merely acts on the alcohol as a chemical agent, without entering into the composition of the ether generated; in which case the ether consists of water and etherine. In other instances the acid employed unites with water and etherine (the ether just mentioned), or with etherine simply. On the basis of these differences of composition, ethers are divided into three kinds:

1. those consisting of water and etherine; 2. those consisting of an acid, water, and etherine; and 3. those composed of an acid and etherine only. Sulphuric ether is an example of the first kind, nitric ether of the second, and muriatic ether of the third. In medicine, the sulphuric and nitric ethers, and their modifications, are those most commonly employed; though occasionally the acetic and muriatic have been used.

Ethers, from their extreme inflammability, ought never to be decanted in the vicinity of flame. Hence it is prudent not to pour them out near a lighted candle. They should be kept in accurately stopped bottles in a cool place; otherwise they are liable to considerable loss by evaporation. B.

ÆTHER SULPHURICUS. *U. S., Lond.* LIQUOR ÆTHEREUS SULPHURICUS. *Dub.* *Unrectified Sulphuric Ether.*

"Take of Alcohol *two pounds and a half;* Sulphuric Acid *a pound and a half.* Pour a pound and a half of the Alcohol into a glass retort, and gradually add the Acid, shaking them frequently, and taking care that the temperature, during the mixture, do not exceed one hundred and twenty degrees. Place the retort very cautiously in a sand-bath, previously heated to two hundred degrees, so that the liquor may boil as speedily as possible, and the ether may pass over into a tubulated receiver, to which another receiver, kept cold by ice or water, is adapted. Distil the liquor until a heavier portion begins to pass over, and appears under the ether at the bottom of the receiver. To the liquor which remains in the retort, add the residue of the Alcohol, and repeat the distillation in the same manner." *U.S.*

The process of the *London* College is essentially the same with the above, which was copied from it, with slight alterations of phraseology to adapt it to the plan of the United States Pharmacopœia.

"Take of Rectified Spirit and of Sulphuric Acid, each, *thirty-two ounces by weight.* Pour the Spirit into a glass retort adapted to bearing a sudden heat, and then pour on the acid in a continued stream; mix them gradually, and let twenty fluidounces of the liquor be distilled, with a sudden and sufficiently strong heat, into a receiver kept cold. If *sixteen ounces* of rectified spirit be poured upon the acid remaining in the retort, sulphuric ethereal liquor will again come over by distillation." *Dub.*

The preparation obtained by these processes is sulphuric ether contaminated with alcohol, water, sulphurous acid, and the oil of wine. In this state it is proper only for external use. For internal exhibition it is freed from these impurities, and then becomes a distinct preparation, called Rectified Sulphuric Ether. This is described in the next article, in which the properties and composition of sulphuric ether, and the theory of its formation will be given.

Off. Prep. Æther Sulphuricus Rectificatus, *U.S., Lond., Ed. Dub.* B.

ÆTHER SULPHURICUS RECTIFICATUS. *U.S.* ÆTHER RECTIFICATUS. *Lond.* ÆTHER SULPHURICUS. *Ed., Dub.* *Rectified Sulphuric Ether.*

"Take of Sulphuric Ether *fourteen fluidounces;* Potassa *half an ounce;* Distilled Water *eleven fluidounces.* Dissolve the Potassa in two fluidounces of the Water, and add the Ether to the solution, shaking them well till they are mixed; then, at a heat of about one hundred and twenty degrees, distil from a large retort into a cooled receiver twelve fluidounces of Rectified Ether. Shake the distilled liquor with nine fluidounces of the Water, and set them by that the Water may subside. Lastly, pour off the supernatant Rectified Ether, and preserve it in a well stopped bottle." *U.S.*, *Lond.*

"Take of Sulphuric Acid, and of Stronger Alcohol [Rectified Spirit], each, *thirty-two ounces*. Pour the Alcohol into a glass retort capable of sustaining a sudden heat, and add to it the acid in an uninterrupted stream. Mix them by degrees, shaking them gently and frequently, and instantly distil from sand, previously heated for the purpose, into a receiver kept cool with water or snow. The heat must likewise be so managed, that the liquor shall boil as soon as possible, and continue to boil till sixteen ounces are drawn off, when the retort is to be removed from the sand. To the distilled liquor add two drachms of potassa, and distil from a very high retort, with a very gentle heat, into a cool receiver, until ten ounces have been drawn off. If *sixteen ounces* of Stronger Alcohol be poured upon the acid remaining in the retort after the first distillation, and the distillation be repeated, more ether will be obtained; and this may be repeated several times." *Ed.*

"Take of Sulphuric Ethereal Liquor *twenty fluidounces*; Carbonate of Potassa, dried and powdered, *two drachms*. Mix them, and from a very high retort, distil, by a very gentle heat, twelve fluidounces into a receiver kept cold. The specific gravity of the liquor is 0.765." *Dub.*

The object of these processes is to obtain a pure sulphuric ether. The first and third formulæ are intended to purify the unrectified sulphuric ether, which is officinal only in the United States, London, and Dublin Pharmacopœias. The second, or Edinburgh process, forms and purifies the ether at one operation. Hence the Edinburgh Pharmacopœia has no preparation corresponding to the unrectified ether of the other Pharmacopœias. By an unfortunate confusion in nomenclature, the title "*Æther Sulphuricus*" means unrectified ether in the United States and London Pharmacopœias, and rectified in those of Edinburgh and Dublin.

The generation and rectification of sulphuric ether, may be considered as different steps of one chemical operation; and are, therefore, most conveniently treated of under the same head. In the process for preparing it, the acid is gradually added to the alcohol to prevent too great a heat, which would generate a portion of ether before the arrangements are completed for collecting it. After the receivers have been attached, and the junctures luted, the retort is placed in a sand-bath, previously heated to 200°, for the purpose of forming the ether quickly; for if the retort were gradually heated, the greater part of the alcohol would distil over, without being converted into ether, and the process would furnish a comparatively small product. The lutings are best made with common paste, spread on strips of muslin, which are first applied, and afterwards, when dry, covered over with slips of moistened bladder. The receiver is refrigerated on account of the great volatility of ether, a part of which, without this precaution, would be lost. A convenient mode for keeping the receivers cold is to lay across them a number of strips of woollen cloth, one end of which is immersed in cold water placed higher than the receivers. By this arrangement, cold water is made continually to trickle over them, whereby they are kept cool; and at the same time the progress of the distillation may be seen, which is not the case when they are immersed in water. The moment when the heavier portion begins to pass over, which is the signal for discontinuing the process, is indicated by the appearance of white vapours in the retort. If the distillation were continued after this, very little ether would be obtained; but there would be generated, sulphurous acid, oil of wine, olefiant gas, carbonic acid, and a large quantity of carbonaceous matter, blackening and rendering thick the residuary liquid.

The above remarks apply to the formula of the U.S. and Lond. Pharmacopœias. The processes of the Edinburgh and Dublin Colleges are in principle the same, and do not require a separate explanation. In repeating the London (U.S.) process, Mr. Phillips obtained twelve fluidounces of product, six fluidrachms of which were the heavy liquid mentioned in the formula, and the remainder the officinal Æther Sulphuricus of sp. gr. 0.768. Upon adding the second portion of alcohol, the quantity of ether produced was nearly similar, but its sp. gr. was as high as 0.807. The process for forming ether, however, is most advantageously performed on a large scale. At Apothecaries' Hall, where the operation is conducted in this way in a cast iron still lined with lead, Mr. Brande informs us that 100 pounds of sulphuric acid and of alcohol are taken, and afford about 52 pounds of ether of the sp. gr. 0.761. Fifty pounds of alcohol are then added to the residue, and upon a second distillation, from 46 to 50 additional pounds of ether are drawn off, having the sp. gr. 0.765. About 100 pounds of impure ether are thus obtained, which, when purified, yield from 55 to 58 pounds of rectified ether of the sp. gr. 0.733. The mixture of acid and alcohol is heated by means of steam, passing through a contorted leaden pipe at the bottom of the still, and supplied by a boiler, situated in an adjoining apartment, and capable of bearing a pressure of 100 pounds to the square inch. Mr. Brande states that if the attempt be made to generate the ether at the temperature of 212° or even 220°, little else than alcohol will pass over. According to this chemist a temperature of from 250° to 280° is required.

The rectification of ether is intended to purify it from sulphurous acid, oil of wine, and alcohol, and is variously conducted according to the different Pharmacopœias. The distillation with a gentle heat from potassa has the effect of separating the sulphurous acid and oil of wine, and the greater part of the alcohol. The remainder of the alcohol passes over with the ether, and is afterwards separated in the United Ststes and London processes by agitation with water. This liquid having a stronger affinity than ether for alcohol, unites with the latter, and forms a combination which sinks, while the pure ether floats above it. The Edinburgh College adds the potassa to the impure ether in the solid state, which is preferable to dissolving it previously in water. This College omits the subsequent agitation with water to separate alcohol, probably because in the distillation so small a portion is drawn off (ten ounces only from sixteen). The Dublin College performs the rectification by a distillation from carbonate of potassa, twelve parts only in twenty being drawn off. This salt is usually employed by the manufacturing chemist, the distillation being continued so long as the ether comes over of a sufficiently low specific gravity.

Properties. Rectified sulphuric ether is a colourless very limpid liquid; of a strong and sweet odour, and hot pungent taste. When as pure as possible, its sp. gr. is about 0.700; but the ether used in medicine is never of so high a strength. The Dublin College directs that rectified ether shall have the sp. gr. 0.765; the United States, London, and Edinburgh Pharmacopœias have omitted to designate the specific gravity of this preparation. Its sp. gr. as obtained at Apothecaries' Hall, London, is 0.733; as directed by the Paris Codex, 0.758. For medicinal purposes, its specific gravity should not be higher than 0.750. It is a very volatile liquid, and when of the sp. gr. 0.720, boils at about the temperature of 98°, and forms a vapour which has the density of 2.5817. Its extreme volatility causes it to evaporate speedily in the open air, with the production of a considerable degree of cold. Its inflammability is very great, and the products of its combustion are water and carbonic acid. In consequence of this property, the greatest caution should be used not to bring it too near a burning body, as for example, a lighted candle, for fear of its accidental inflammation. When too long kept, it undergoes decomposition, and becomes converted in part into acetic acid. Phosphorus and sulphur are slightly soluble in it, and the former is generally exhibited in ether ealsolution. (See *Phosphorus* in the Appendix.) Water dissolves a tenth of its weight of ether, and reciprocally ether takes up a small portion of water. It unites in all proportions with alcohol.

Composition, and Theory of its Production. Sulphuric ether consists, in ultimate constituents, of five equiv. of hydrogen 5, four of carbon 24.48, and one of oxygen 8=37.48; or in volumes, of five volumes of hydrogen, four volumes of the vapour of carbon, and half a volume of oxygen, condensed into one volume of ether vapour. Its proximate constituents are one equiv. of etherine 28.48, and one equiv. of water 9=37.48; or in volumes, one volume of etherine, and one volume of the vapour of water, condensed into one volume. The sp. gr. of its vapour, calculated on this composition in volume, is 2.5817, which is very near 2.586, the number obtained by experiment. By this statement of the composition of *sulphuric* ether, it is perceived that it contains no *sulphuric* acid, contrary to what its name would seem to indicate. The fact is, that it is called *sulphuric* ether, merely in allusion to the agency of the acid usually employed in its preparation; but an identical ether may be obtained by the action of other acids on alcohol. The French chemists, in allusion to the water which it contains, sometimes call it *hydric ether.*

With a view to determine in what manner sulphuric acid acts upon alcohol in order to convert it into ether, it is necessary that a comparison should be instituted between the composition of the two latter. It has already been stated under *Alcohol*, p. 57, that this liquid, according to modern views, consists of one equiv. of etherine and two equiv. of water; and ether, as just mentioned, is composed of one equiv. of etherine and one equiv. of water. It thus appears that alcohol to be converted into ether, only requires to lose one equiv. of water, that is, half the water present in it. On this view, then, the theory of etherification consists in the abstraction from alcohol of half the essential water which it contains. The agent in effecting this abstraction is evidently the sulphuric acid, which is known to have a strong affinity for water. If the original proportions of acid and alcohol continued the same throughout the whole of the distillation, all the alcohol would be resolved into water and ether; but, during the progress of the process, the alcohol is constantly diminishing, and of course the relative excess of the acid becoming greater; and at last a point of time arrives when the excess of acid is so great that the generation of ether ceases. As these results depend upon the relative deficiency of the alcohol, while the acid remains but slightly changed in amount, it is easy to understand why a second distillation may be practised, as prescribed in the Pharmacopœias, by adding a fresh portion of alcohol to the residue in the retort; for by this addition, the proper relative proportion of the alcohol to the acid is restored. But the repetition of the distillation in this manner has its limit; as the acid becomes at last too dilute to react upon the alcohol.

Medical Properties and Uses. Ether is a powerful diffusible stimulant, though transient in its operation. It is also esteemed antispasmodic and narcotic. Its vapour when breathed from a bladder in which a few teaspoonfuls have been put, produces a transient intoxication, resembling the effects of respiring nitrous oxide, but very dangerous if carried too far. In some stages of low fevers, attended with subsultus tendinum, ether sometimes proves useful as a stimulant and antispasmodic. It is useful also in nervous headach unattended with vascular fulness, some states of hysteria, and generally in nervous and painful diseases which are unaccompanied by inflammation. In catarrhal dyspnœa, and spasmodic asthma, its vapour may be inhaled with advantage by holding in the mouth a piece of sugar, to which a few drops of ether have been previously added. In nausea it is given as a cordial, and in flatulence of the stomach it sometimes acts with singular efficacy. According to Mr. Brande, a small teaspoonful of ether mixed with a glass of white wine, is often a most effectual remedy for allaying the distressing symptoms of sea-sickness. When externally applied it may act either as a stimulant or refrigerant. If its evaporation be repressed, it operates as a powerful rubefacient, and may even vesicate; but when its evaporation is allowed to take place freely, it is refrigerant in consequence of the great degree of cold which it produces. In the latter way it is sometimes employed in strangulated hernia. Dr. A. T. Thomson has found ether sometimes to produce immediate relief when dropped in the ear in earach. For external use, the unrectified ether may be employed. The dose of rectified ether is from half a fluidrachm to two fluidrachms, to be repeated frequently when the full effect of the remedy is desired. It may be perfectly incorporated with water or any aqueous mixture, by rubbing it up with spermaceti, employed in the proportion of two grains for each fluidrachm of the ether. The ether and spermaceti are to be rubbed together in a mortar, until the latter is perfectly dissolved; and to the solution thus formed the water or mixture is to be added, while the whole is constantly stirred. The incorporation being finished, the operation is completed by passing the mixture through a piece of muslin to separate the spermaceti. (Durand, *Journ. of the Phil. Col. of Pharm.* iv. 202.)

Off. Prep. Spiritus Ætheris Sulphurici, *U. S.*, *Lond.*, *Ed.* B.

OLEUM ÆTHEREUM. *U.S.*, *Lond.* LIQUOR ÆTHEREUS OLEOSUS. *Dub.* *Ethereal Oil.* *Oil of Wine.*

"After the distillation of Sulphuric Ether, carry on the distillation with a less degree of heat, until a black froth begins to rise; then immediately remove the retort from the fire. Add water to the liquor in the retort, that the oily part may float upon the surface. Separate this and add to it sufficient Lime-water to neutralize the acid present, and shake them together. Lastly, when the oil has separated, remove it." *U.S.*, *Lond.*

"Take what remains in the retort, after the distillation of Sulphuric Ether. Distil down to one half, with a moderate heat." *Dub.*

Towards the end of the distillation of Rectified Sulphuric Ether, there is formed a small quantity of a peculiar oleaginous matter, usually called *oil of wine.* This matter is the officinal ethereal oil, the object of the above processes. The formation of this oil is connected with complicated changes, which are not well understood. It appears that during the reaction which takes place between sulphuric acid and alcohol in the process for making ether, two compounds of etherine with sulphuric acid are formed; one a bisulphate of etherine with two equiv. of water, called *sulphovinic acid*; the other a neutral sulphate, consisting of two equiv. of acid and two of etherine, with one equiv. of water, which is the officinal *ethereal oil*, or *heavy oil of wine.* As etherine with two equiv. of water constitutes alcohol, it follows that sulphovinic acid may be viewed as a bisulphate of alcohol. For a description of etherine, see page 57.

Sulphovinic acid combines with bases, forming salts called sulphovinates, which may be viewed as double sulphates of etherine and the added base. When a sulphovinate, as for example the sulphovinate of lime, is heated in a retort, furnished with a receiver, sulphate of lime is left behind, while a portion of the sulphate of etherine, or heavy oil of wine, distils over unchanged. If this, after being purified, be heated in a matrass with a long neck, covered with a stratum of water, it will entirely disappear, being resolved into sulphovinic acid which will dissolve in the water, and a light oily matter which will float on its surface. This oily matter consists of a liquid and a solid principle, separable from each other by the application of a freezing temperature; the former being called the *light*, the latter, the *concrete oil of wine.* Thus chemists recognise at present three oils of wine,—the *heavy* or sulphate of etherine, the *light*, and the *concrete.* The first, or the officinal oil, alone contains sulphuric acid; the other two are isomeric with etherine, and devoid of this acid.

The officinal oil of wine is not easily obtained. The U. S. process, which is adopted from the London, furnishes but a small amount of it, and is difficult of execution. An easier way of obtaining it is to distil the sulphovinate of lime (the double sulphate of lime and etherine); when the officinal oil of wine (sulphate of etherine) will come over. It is best purified from alcohol and ether by washing it with water, and from water and sulphurous acid by exposure to the action of sulphuric acid under an exhausted receiver. The Dublin formula is altogether defective. By distilling the residue of the sulphuric ether process "down to one half with a moderate heat," the oil of wine is no doubt generated; but it is mixed with various substances, from which no directions are given in the formula for its separation.

Properties. The *officinal ethereal oil* is green or colourless, and possesses an oleaginous consistency, an aromatic odour, and a pungent taste. Its sp. gr. is 1.133. Sparingly soluble in water, it is very soluble in alcohol and ether. Though containing sulphuric acid, it has no acid reaction, its acid being completely neutralized by the etherine with which it is united. The *light oil of wine* has a slightly yellow colour, and an aromatic odour, which is developed by rubbing it between the fingers. It communicates a greasy stain to paper. Its density at 51° is 0.917, and its boiling point very high. The *concrete oil* crystallizes in long transparent and brilliant prisms. It has no taste, and a smell like that of the light oil. Its density is 0.960. It melts at 230°, and volatilizes without change at 500°. It is insoluble in water, but soluble in alcohol and ether.

The officinal oil is not used in medicine in a separate state, but enters into the composition of the compound spirit of sulphuric ether, or Hoffmann's anodyne.

Off. Prep. Spiritus Ætheris Sulphurici Compositus, *U.S.*, *Lond.* B.

SPIRITUS ÆTHERIS SULPHURICI. *U.S.*, *Lond.* ÆTHER SULPHURICUS CUM ALCOHOLE. *Ed.* *Spirit of Sulphuric Ether.*

"Take of Rectified Sulphuric Ether *half a pint;* Alcohol *a pint.* Mix them." *U.S.*, *Lond.*

"Take of Sulphuric Ether *one part;* Stronger Alcohol *two parts.* Mix them." *Ed.*

This preparation is merely rectified ether diluted with twice its volume or weight of alcohol. When prepared with materials of proper strength, its sp. gr. is 0.816. Its medical properties are similar to those of ether. Its dose is from one to three fluidrachms, given with a sufficient quantity of water. B.

SPIRITUS ÆTHERIS SULPHURICI COMPOSITUS. *U.S., Lond. Compound Spirit of Sulphuric Ether. Hoffmann's Anodyne Liquor.*

"Take of Spirit of Sulphuric Ether *a pint;* Ethereal oil *two fluidrachms.* Mix them." *U.S., Lond.*

This preparation is intended as a substitute for the anodyne liquor of Hoffmann, which it closely resembles. In addition to the stimulating and antispasmodic qualities of the ether which it contains, it possesses anodyne properties, highly useful in nervous irritation, and want of sleep arising from this cause. These additional virtues it derives from the officinal or heavy oil of wine, which is a more important substance than is generally admitted. Mr. Brande asserts that the only effect of it in the preparation under notice, is to alter the flavour of the Spirit of Sulphuric Ether. In this assertion he is certainly in error. Dr. Hare, in his Chemical Compendium, reports the opinion of Drs. Physick and Dewees, in favour of the efficacy of the officinal oil of wine, dissolved in alcohol, in certain disturbed states of the system as a tranquillizing and anodyne remedy. Such indeed are the generally admitted effects of Hoffmann's anodyne, when made with a due admixture of the ethereal oil; but the Spirit of Sulphuric Ether is often improperly sold for it. When properly prepared, it becomes milky on being mixed with water, in consequence of the precipitation of the oil. It is on many occasions a useful adjunct to laudanum, to prevent the nausea which is liable to be excited by the latter in certain habits. Its dose is from half a fluidrachm to two fluidrachms in any proper vehicle. B.

SPIRITUS ÆTHERIS AROMATICUS. *Lond.* ÆTHER SULPHURICUS CUM ALCOHOLE AROMATICUS. *Ed. Aromatic Spirit of Ether.*

"Take of Cinnamon Bark, bruised, *three drachms;* Cardamom Seeds, in powder, *a drachm and a half;* Long Pepper, in powder, Ginger Root, sliced, each, *a drachm;* Spirit of Sulphuric Ether *a pint.* Macerate for fourteen days in a well stopped glass bottle, and filter." *Lond.*

"Take of Cinnamon Bark, bruised, Lesser Cardamom Seeds, bruised, each, *an ounce;* Long Pepper, in powder, *two drachms;* Sulphuric Ether with Alcohol, *two pounds and a half.* Digest for seven days, and filter through paper." *Ed.*

This is merely the Spirit of Sulphuric Ether, rendered more grateful by aromatics. The difference between the two formulæ for its preparation is not important; but we should prefer the London. Its medical properties and dose are the same as those of the preparation which forms its basis. It is very rarely if ever prescribed. B.

ÆTHER NITROSUS. *Dub. Nitrous Ether (Nitric Ether).*

"Take of Purified Nitrate of Potassa, dried, and coarsely powdered, *a pound and a half;* Sulphuric Acid *a pound;* Rectified Spirit *nineteen fluidounces.* Put the Nitrate of Potassa into a tubulated retort, placed in a bath of cold water, and pour on it, by degrees and at intervals, the Sulphuric Acid and Spirit, previously mixed, and cooled after their mixture. Without almost any external heat, or at most a very gentle one, (as of warm water added to the bath,) the ethereal liquor will begin to distil without the application of fire. In a short time, the heat of the retort will increase spontaneously, and a considerable ebullition will take place, which must be moderated by reducing the temperature of the bath with cold water. The receiver must also be kept cold with water or snow, and furnished with a proper apparatus for transmitting the highly elastic vapour (bursting from the mixture with great violence if the heat be too much increased) through a pound of Rectified Spirit contained in a cooled bottle.

"The ethereal liquor thus spontaneously distilled, is to be received into a phial with a ground glass stopper; and then must be added by degrees (closing the phial after each addition) as much very dry and powdered carbonate of potassa as will suffice to saturate the excess of acid, using litmus as the test. This is effected by the addition of about a drachm of the salt. In a short time the Nitrous Ether will rise to the surface, and is to be separated by means of a funnel.

"If the Ether be required very pure, distil it again to one-half, from a water-bath at a temperature of 140°. Its specific gravity is 0.900." *Dub.*

The Dublin is the only Pharmacopœia commented on in this work, which embraces nitrous (nitric) ether among its preparations. The mutual reaction of nitric acid and alcohol is so violent, that the formation of this ether has justly been regarded as a process of difficulty. The method adopted by the Dublin College, in their formula, was contrived by Wolfe, and is commended by Pelletier, as well adapted for obtaining this ether with facility and safety. The alcohol is not mixed directly with nitric acid, but with the materials necessary for generating it. Upon the addition of the mixture of sulphuric acid and alcohol to the nitre, this salt is decomposed, and the disengaged nitric acid gradually reacts upon the alcohol, and generates the ether in question. The saline residue in the retort is sulphate of potassa. The heat evolved upon mixing the materials is so considerable, that the application of extraneous heat becomes unnecessary, and even hazardous. Indeed, as the action advances, the temperature of the mixture must be moderated by the application of cold water. The violent action arises from the vast quantity of gases and vapours suddenly given off. These are nitrogen, nitrous and nitric oxide, carbonic acid, and the vapours of water, nitrous acid, and of the nitric ether itself. Notwithstanding the cold employed, a portion of the nitric ether escapes condensation in the receiver, and hence the Dublin College, to save this portion, directs a cooled bottle to be connected with it, containing a pound of alcohol, into which the uncondensed ether is allowed to pass. The alcohol thus impregnated is subsequently employed in the Dublin formula for sweet spirit of nitre. (See *Spiritus Ætheris Nitrici.*) The ether condensed in the receiver is not pure, but contains a little nitrous, nitric, and acetic acids. To remove these, the ethereal product is shaken with carbonate of potassa, which has the effect of saturating them.

Nitric ether is prepared by Thenard according to the following process, which is adopted, with slight modifications, in the Paris Codex. Equal weights of alcohol and nitric acid, contained in a retort having a capacity double their volume, are distilled by a moderate heat, into a Wolfe's apparatus of five bottles, the first of which is empty, and the four others half filled with saturated brine. Each bottle is placed in an earthen pan containing a mixture of ice and salt. The apparatus being thus arranged, a few live coals are placed under the retort, whereupon the liquid enters quickly into ebullition. The fire must then be immediately withdrawn, and the ebullition moderated, by allowing some water pressed from a sponge to flow over the retort. The process is terminated when the spontaneous ebullition ceases; at which time the liquid in the retort forms a little more than a third of the quantity of alcohol and acid employed. In the first bottle, a large quantity of yellow liquid will be found, consisting of much weak alcohol, o ether, and nitrous, nitric, and acetic acids; in the second, a pretty thick stratum of ether, containing a little acid and alcohol, and swimming on the surface of the brine; in the third, a very thin stratum, of the same nature as tha in the second, and so on for the rest. The several layers of ether are then separated by means of a funnel, mixed together, and redistilled by a moderate heat, into a refrigerated receiver. The first product is the ether, which, to be perfectly pure, and devoid of acidity, must be allowed to remain in a bottle for half an hour, in contact with powdered lime. From 500 parts of alcohol, and 500 of acid, Thenard obtained 100 of excellent ether.

Dr. Hare has contrived an apparatus for generating nitric ether, which answers very well. It consists of a three-necked bottle, the outer orifices of which are furnished with glass funnels with stop-cocks; of a glass tube three feet long; and of a tubulated receiver, surrounded with a freezing mixture. The tube is arranged in an inclined position, and surrounded also by a freezing mixture contained in a wooden trough, and is so bent at its extremities, that the upper end may be attached to the middle neck of the bottle, and the lower to the receiver. The apparatus being thus arranged, alcohol is added to the bottle, through one of the funnels, to the depth of half an inch, and afterwards nitric acid is cautiously introduced through the other funnel, sufficient to cause an active ebullition. When this relaxes, more acid is added, and so on at intervals until the ebullition ceases to be renewed. When this happens, the alcohol is again added at intervals, until it ceases to excite any action in the materials, when the process is finished. The ether generated is effectually condensed by the frigorific mixture, and is collected in the receiver.

Dr. Duncan states in his Dispensatory, that he has "repeatedly prepared nitric ether with great facility and safety, by putting alcohol into a tubulated retort having a small long-tubed funnel introduced through a cork in the tubulature, so that the end of the funnel was immersed in the alcohol, pouring nitrous acid through this slowly, until reaction commenced, and waiting till it ceased before more acid was added in successive portions, until the whole proportion intended was added. After the spontaneous action had ceased, heat was cautiously applied as long as ether was produced." To condense the products, a Wolfe's apparatus was used, kept very cold. The first bottle was empty, and in it the principal part of the ether condensed; the second contained water, and the third alcohol. From this last a tube proceeded to give exit to the gases. This method of Dr. Duncan is probably a good one, and has the merit of being easily executed.

Properties. Nitrous or nitric ether as it is variously called, is a yellowish-white liquid, of an acrid and burning taste, and a smell resembling that of sulphuric ether, but much stronger. When simply washed with water, Dr. Duncan found its sp. gr. to be 0.912; but in this state it contained acid. When this was removed, its density became 0.896, and when rectified by a new distillation it fell to 0.866. The Dublin College and the Paris Codex direct its sp. gr. to be 0.900. This ether, therefore, is much heavier than the sulphuric, and even heavier than alcohol. When agitated with water it is divided into three portions; a small portion dissolves, a second evaporates, and a third is decomposed. The aqueous solution becomes immediately acid, and acquires the smell of apples. Nitric ether is soluble in all proportions in alcohol; and with a variable portion of the latter forms the spirit of nitric ether, or sweet spirit of nitre. It is more volatile than sulphuric ether, entering into ebullition at 70°. It is highly inflammable, and burns with a white flame, without residue. It is very liable to spontaneous decomposition, becoming acid after the lapse of a few days. It should be kept in full bottles in a dark cool place, and prepared in small quantities at a time.

Composition. Nitric ether consists of one equiv. of hyponitrous acid

38.15, and one equiv. of ether 37.48=75.63. Admitting this composition to be correct, its proper name would be *hyponitrous ether*.

Medical Properties and Uses. Nitric ether is seldom used in medicine. Its medical virtues are probably the same as those of sulphuric ether. B.

SPIRITUS ÆTHERIS NITRICI. *U.S., Lond.* Spiritus Ætheris Nitrosi. *Ed.* Spiritus Æthereus Nitrosus. *Dub.* *Spirit of Nitric Ether. Sweet Spirit of Nitre.*

"Take of Nitrate of Potassa, in powder, *two pounds;* Sulphuric Acid *a pound and a half;* Alcohol *nine pints and a half;* Diluted Alcohol *a pint;* Carbonate of Potassa *an ounce.* Mix the Nitrate of Potassa and the Acid in a glass retort, and, having gradually poured in the Alcohol, digest with a gentle heat for two hours; then raise the heat, and distil a gallon. To the distilled liquor add the Diluted Alcohol and Carbonate of Potassa, and again distil a gallon." *U.S.*

"Take of Rectified Spirit *two pints;* Nitric acid, by weight, *three ounces.* Add the Acid to the Spirit by slow degrees, and mix them, taking care that the temperature does not exceed one hundred and twenty degrees; then, by means of a gentle heat, distil twenty-four fluidounces." *Lond.*

"Take of Stronger Alcohol [Rectified Spirit] *three pounds;* Nitrous Acid *a pound.* Pour the Alcohol into a capacious phial, placed in a vessel full of cold water, and add the Acid by degrees, constantly agitating them. Let the phial be slightly covered, and placed for seven days in a cool place; then distil the liquor with the heat of boiling water, into a receiver kept cool with water or snow, until about three pounds come over." *Ed.*

"Add to the matter which remains after the distillation of Nitrous Ether, the Rectified Spirit employed in that operation for condensing the elastic vapour, and distil till the residuum be dry, with the *superior* heat of a water-bath. Mix the distilled liquor with the alkaline liquor which remains after the separation of the Nitrous Ether, and add, moreover, as much well dried Carbonate of Potassa as shall be sufficient to saturate the predominant acid. This is made evident by the test of litmus. Lastly, distil as long as any drops come over by the *medium* heat of a water bath. The specific gravity of this liquor is 0.850.

"Nitrous Ethereal Spirit may also be prepared by adding gradually *two ounces* of Nitric Acid to *a pint* of Rectified Spirit, and distilling twelve ounces with a proper apparatus and the application of a gentle heat." *Dub.*

The Spirit of Nitric Ether is a mixture, in variable proportions, of nitric ether and alcohol. Nitric ether is always generated by the mutual reaction of nitric acid and alcohol; and it matters not whether the alcohol be mixed with nitric acid directly, or with the materials for generating it, namely, nitre and sulphuric acid. When the materials for forming the ether contain an excess of alcohol, this distils over with the ether, and forms the preparation under consideration.

The processes given above differ considerably. The U.S. and Dublin Pharmacopœias obtain the requisite nitric acid by using the materials for generating that acid; while the London and Edinburgh Colleges mix the acid ready formed with the alcohol. The different formulæ will be noticed in the order just named.

The U.S. formula is modeled after a recipe communicated by Mr. John Carter, manufacturing chemist, to the Philadelphia College of Pharmacy, and recommended for adoption by a committee of that body. It is in fact the Dublin process for obtaining nitric ether, explained in the preceding article, with the use of alcohol in excess. The nitre and sulphuric acid being placed in the retort, the materials are ready for generating the nitric acid. The alcohol being gradually added, and a gentle heat applied, the nitric acid is set free, and by reacting on a part of the alcohol produces the ether. Upon the subsequent increase of the heat, this ether and the remainder of the alcohol distil over as the spirit of nitric ether. The distilled product, however, contains some acid, and hence is rectified by a distillation from carbonate of potassa. The diluted alcohol is added before commencing this distillation, to enable the operator to obtain a quantity of distilled product equal to that procured at first, without distilling to dryness, which would endanger the production of empyreuma. The sulphuric acid and alcohol are added successively to the nitre, and not previously mixed; as by the latter plan, the sulphuric acid would be converted in part into sulphovinic acid, and the risk would be run of generating some sulphuric ether. The retort should be of such a capacity as to be capable of holding twice the amount of the materials employed. It would be an improvement in this formula, if the nitre were directed to be bruised, rather than powdered; as the more slowly the nitric acid is liberated, the more safely the process may be conducted.

The above process, as conducted by Mr. Carter on a large scale, is performed in a copper still of about twenty gallons capacity, and furnished with a pewter head and worm. The materials for the first distillation are 18 pounds of purified nitre, 12 gallons of alcohol of 34° Baumé (0.847), and 12 pounds of sulphuric acid; and 10 gallons are drawn off. The distilled product is then mixed with a gallon of diluted alcohol, and rectified by a new distillation from lime or a carbonated alkali; the same quantity being distilled as at first. When large quantities of this preparation are thus obtained, the several portions require to be mixed in a large glass vessel, to render the whole of uniform strength; as the portion which first comes over in the rectification is strongest in nitric ether. Previous to the redistillation, the head and worm must be washed thoroughly with water, to remove a little acid which comes over in the first distillation. (*Journ. of the Phil. Col. of Pharm.* i. 308.)

A similar process to the above for making sweet spirit of nitre, is adopted in the principal laboratories of Philadelphia. As the use of metallic vessels is attended with some risk, it would be an improvement in the above process, if an earthenware still and worm were employed, as is done at Apothecaries' Hall, London; the still being heated by the slow application of steam to its outer surface.

In order to understand the process of the Dublin College for preparing sweet spirit of nitre, it will be necessary to revert to their formula for obtaining nitric ether, and the explanations connected with it. The residue of the latter process consists of sulphate of potassa, free nitric acid not consumed in the generation of the nitric ether, and, perhaps, a portion of alcohol. To this residue is added, the pound of alcohol which had been employed in the process for nitric ether for the purpose of absorbing the ether which escapes condensation in the receiver. Of course, after this addition, all the conditions are fulfilled which are necessary for the generation of spirit of nitric ether, namely, nitric acid in contact with more alcohol than is necessary to form ether. Accordingly, upon distillation, the nitric ether comes over mixed with a certain portion of alcohol, forming the spirit in question. But at the same time, a portion of acid is distilled over, to free it from which, the product is redistilled from an alkaline carbonate at a *medium* heat (between 100° and 200°) as long as any drops come over. To save the alkaline solution used in purifying nitric ether, it is directed to be applied, as far as it will go, to the purpose of saturating the acid of this preparation.

From the explanations here and previously given, it is obvious that the formulæ for nitric ether and sweet spirit of nitre of the Dublin College form in fact but one process; and whenever it is desirable to obtain nitric ether, it is no doubt economical to use the residue and part of the products of this process for preparing sweet spirit of nitre. But the fact is, that nitric ether is seldom or never employed in medicine, and has very few other uses; and hence the Dublin formula for the sweet spirit of nitre is ineligible, as including the preparation of another substance which may not be wanted. It is, no doubt, on this account, that the College has appended to its principal process another formula, (very nearly the same as that of the London College,) indicating the mode by which sweet spirit of nitre may be obtained independently of any other product.

The London and Edinburgh processes for this preparation are in principle the same, namely, the addition of nitric acid, ready formed, to alcohol; but the proportions employed are very different. In the London formula, the acid is to the alcohol as 1 to 8 nearly; in the Edinburgh, as 1 to 3. The proportion of nitric acid to alcohol for mutual reaction in the U.S. formula, is about the same as in the London process, if we suppose that the nitre, by its decomposition, yields a pound and a quarter of acid, which is about the quantity obtained in practice. This coincidence may be assumed with the greater confidence, as the preparation obtained by these two formulæ has about the same specific gravity. The proportion of alcohol in the Edinburgh formula is so deficient, that the product must be very strong in nitric ether. The directions of this College to keep the acid and alcohol mixed for seven days, answers no useful purpose, and is, therefore, a waste of time. The proportion of the spirit drawn off to the alcohol employed is different in the different formulæ. It is three-fourths in the London formula, five-sixths in that of the U.S. Pharm., and exactly equal to the alcohol employed in the Edinburgh. When the distillation is pushed too far, the product is apt to be contaminated with nitric acid. This risk is avoided almost entirely by the London College, by distilling only twenty-four fluidounces; but if accidentally the distillation be continued too long, a very acid liquor comes over. By following the directions of the Edinburgh formula, the acidity of the product would seem to be almost inevitable. From these considerations, we think that the London and Edinburgh Colleges have erred in not directing a rectification, as is ordered in the U.S. and Dublin Pharmacopœias.

Properties. Spirit of nitric ether is a colourless liquid, of a grateful ethereal odour, and, when recently prepared, of a very pungent, and slightly sweet and bitter taste. When kept for a few weeks, it acquires a decided acidity, and becomes sourish to the taste. When thus changed, it may be rectified by saturating the acid present with lime-water, and redistilling. It is very inflammable and volatile, but less so than sulphuric ether. It is readily soluble in water, and unites with any additional portion of alcohol to that which it already contains. Its sp. gr. is necessarily variable, as obtained by different formulæ. The density prescribed for it by the Dublin College is 0.850; but it ought not to exceed 0.834; which differs very little from the density of the officinal alcohol or rectified spirit, which weighs 0.835. The preparation as obtained by Mr. Carter's formula has the sp. gr. 0.833 at 65°. Unfortunately, however, specific gravity is not a criterion of its quality; as its appropriate density may be preserved, even after being weakened by a large quantity of alcohol. When tincture of guaiac is added to it, a peculiar blue tint is produced, which soon passes into various shades of green, without disturbing its transparency. Perhaps this tincture might afford the means of determining the quality of sweet spirit of nitre. Some test of this kind would be a highly desirable acquisition, on account of the extensive use made of this preparation, and the frequent sophistications to which it is subjected. It is stated on good authority, that it has been variously diluted, according to the views of the vender, with twice, thrice, and even four times its weight of alcohol and water. In some shops a strong and weak preparation has been kept, to suit the views of customers as to price. Some of the wholesale druggists are in the habit of diluting it, either under the plea that the physician's prescriptions are drawn up in contemplation of the use of a weak preparation, or for the purpose of affording it at a low price. All this confusion in regard to an important medicine would disappear, if the different manufacturing chemists in the Union would comply with the recommendation of the Philadelphia College of Pharmacy, and adopt for its preparation the formula of the United States Pharmacopœia. A uniform preparation being in this way furnished to the druggists, all that would be necessary on their part would be carefully to abstain from weakening it by the admixture of alcohol and water.

Sweet spirit of nitre is very prone to become acid by keeping; and a slight acidity is almost unavoidable. It is best preserved by being kept in accurately stopped half-pint bottles in a cool place. Its specific gravity ought not to exceed 0.834. If acid be present in considerable amount, it may be detected by the taste, by its acting strongly on litmus, or by effervescence being produced on the addition of a crystal of carbonate of soda. Its essential constituents are nitric ether and alcohol in proportions not well ascertained.

Medical Properties and Uses. Sweet spirit of nitre is diaphoretic, diuretic, and antispasmodic. It is deservedly much esteemed as a medicine, and is extensively employed in febrile affections for the purpose of promoting the secretions, especially those of sweat and urine. It often proves a grateful stimulus to the stomach, relieving nausea and removing flatulence, and not unfrequently allays restlessness and promotes sleep. On account of its tendency to the kidneys, it is often conjoined with other diuretics, such as squill, digitalis, nitre, &c., for the purpose of promoting their action in dropsical complaints. Dr. Duncan praises a combination of it with a small portion of aromatic spirit of ammonia, as eminently diaphoretic and diuretic, and well suited to certain states of febrile disease. The dose varies from twenty drops to a teaspoonful, given every two or three hours in a portion of water.

B.

ALCOHOL.

Preparations of Alcohol.

ALCOHOL DILUTUM. *U.S.* Spiritus Tenuior. *Lond.*, *Dub.* Alcohol Dilutius. *Ed.* *Diluted Alcohol.* *Proof Spirit.*

"Take of Alcohol, Distilled Water, each, *a pint*. Mix them." *U.S.*

The British Colleges have placed diluted alcohol or proof spirit in the list of the Materia Medica. The *London* College directs its sp. gr. to be 0.930. When of this strength, it contains 44 per cent. of pure alcohol, and may be formed by mixing four measures of their rectified spirit with three of water. In the *Dublin* Pharmacopœia, it is ordered of the sp. gr. 0.919, and the statement is made in a note, that spirit of almost the same specific gravity may be formed by mixing five and a quarter measures of rectified spirit, with three of distilled water. Such a spirit will contain about 49 per cent. of absolute alcohol. The directions of the *Edinburgh* College are more explicit; for it first explains that "Alcohol Dilutius" means "Alcohol Fortius" mixed with an equal measure of water, and then states its sp. gr. to be 0.935. It is perceived, therefore, that the diluted alcohol of the U. S. Pharmacopœia corresponds precisely with that of the Edinburgh College; being alcohol of the same strength diluted to an equal extent. Its sp. gr. must consequently be identical, or 0.935 also. Such spirit will contain 42 per cent. of absolute alcohol, and forms the weakest officinal diluted alcohol.

Medical and Pharmaceutical Uses. The medicinal effects of alcohol in a diluted and modified state, as it exists in brandy and other ardent spirits, have been detailed under other heads. (See *Alcohol* and *Vinum.*) As a pure diluted spirit, however, consisting solely of alcohol and water in determinate proportions, its use is exclusively pharmaceutical. It is employed as an addition to some of the distilled waters and preparations of vinegar, in order to preserve them from decomposition; as a menstruum for extracting the virtues of some plants, preparatory to their being brought to the state of extracts and syrups; and in preparing many of the spirits. But it is in forming the tinctures that diluted alcohol is principally employed. Many of these are formed with the officinal alcohol (rectified spirit), but the majority, with diluted alcohol (proof spirit) as the menstruum. As the latter contains more than half its weight of water, it is well fitted for acting on those vegetables, the virtues of which are partly soluble in water and partly in alcohol. The apothecary however is, on no account, to substitute the commercial proof spirit for diluted alcohol, even though it should be of the same strength. On this point, the authors of the Dublin Pharmacopœia have very correctly remarked, that "almost all the spirit which is sold under the name of proof spirit, is contaminated with empyreumatic oil, and unfit for medical use." But when it is recollected how variable the so called proof spirits are in strength, the objection to their use in pharmacy becomes still stronger. Thus, according to Mr. Brande, gin contains 51.6 per cent. of alcohol of 0.825; and the percentage of the same alcohol is 53.39 in brandy, 53.68 in rum, 53.90 in Irish whiskey, and 54.32 in Scotch whiskey. The alcohol on which these results are based already contains 11 per cent of water. B.

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ALUMEN.

Preparations of Alum.

ALUMEN EXSICCATUM. *U.S., Lond., Ed.* ALUMEN SICCATUM. *Dub. Dried Alum.*

"Take of Alum *any quantity*. Melt it in an earthen or iron vessel over the fire, and continue the heat till it becomes dry; then rub it into powder." *U.S.*

"Melt Alum in an earthen vessel over the fire; and then increase the heat until ebullition ceases." *Lond.*

The *Edinburgh* and *Dublin* processes agree with that of the U.S. Pharmacopœia. When alum is heated, it quickly dissolves in its water of crystallization, which, if the heat be continued, is gradually driven off; and the salt swells up exceedingly, so as to make it expedient to use a vessel, the capacity of which is at least equal to three times the bulk of the alum operated on. When the boiling up has ceased, it is a sign that all the water has been driven off, and the preparation is finished.

Properties. Dried alum is in the form of an opaque white powder, possessing a more astringent taste than the crystallized salt. Before pulverization, it is a light, white, opaque, porous mass. During the exsiccation, it loses from 41 to 46 per cent. of its weight in dissipated water. If, however, the heat be very strong, some of the acid is driven off, and the loss becomes still greater. Dried alum resists the action of water for a long time, showing that the process to which it has been subjected has altered its state of aggregation. In composition, it differs from crystallized alum merely in the absence of water. (See *Alumen.*)

Medical Properties and Uses. Dried alum has occasionally been given to the extent of a scruple in obstinate constipation, with the effect of gently moving the bowels, and of affording great relief from pain; but its principal medical use is as an escharotic for destroying fungous flesh. B.

LIQUOR ALUMINIS COMPOSITUS. *Lond.* *Compound Solution of Alum.*

"Take of Alum and Sulphate of Zinc, each, *half an ounce;* boiling Water *two pints.* Dissolve the Alum and Sulphate of Zinc in the Water, and filter through paper." *Lond.*

This was formerly called *aqua aluminosa Bateana,* or *Bates's alum water.* It is a powerful astringent solution, and is employed for cleansing and stimulating foul ulcers, and as an injection in gleet and leucorrhœa. It is also sometimes employed as a collyrium in ophthalmia after depletion; but when used in this way it must be diluted. A convenient formula is half a fluidounce of the solution mixed with six and a half fluidounces of rose water.

B.

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AMMONIA.

Preparations of Ammonia.

ALCOHOL AMMONIATUM. *U.S., Ed.* SPIRITUS AMMONIÆ. *Lond., Dub.* *Ammoniated Alcohol.*

"Take of Alcohol [Rectified Spirit] *two pints and a half;* Lime, recently burnt, *a pound;* Muriate of Ammonia *eight ounces;* Water *six fluidounces.* From these let the Ammoniated Alcohol be prepared in the manner directed for Water of Ammonia." *U.S.*

"Take of Stronger Alcohol [Rectified Spirit] *thirty-two ounces;* fresh Lime *twelve ounces;* Muriate of Ammonia *eight ounces;* Water *six ounces.* Pour the Water on the pounded Lime in an iron or earthenware vessel; then cover the vessel until the lime falls to powder and becomes cold. Then mix the Muriate in very fine powder with the Lime, and rubbing them together n a mortar, immediately introduce them into a glass retort. Place the retort n a sand-bath, and fit on closely a receiver furnished with a tube which asses to the bottom of a bottle containing the alcohol, and of such a size as nly to be two-thirds full. Lastly, apply heat, and gradually increase it until the bottom of the iron pot becomes red, and continue it as long as gas and liquid come over." *Ed.*

"Take of Proof Spirit *three pints;* Muriate of Ammonia *four ounces;* Subcarbonate [Carbonate] of Potassa *six ounces.* Mix, and by means of a gentle heat, distil a pint and a half into a cooled receiver." *Lond.*

"Take of Rectified Spirit *three pints;* Carbonate of Ammonia, coarsely powdered, *three ounces and a half.* Mix them, and dissolve the salt with a medium heat; then filter the liquor." *Dub.*

The product of these processes is considerably different. The process of the *United States* Pharmacopœia is in effect the same as that of the *Edinburgh* College, the nearest measures for the liquids being merely substituted for weights. These two processes consist simply in the saturation of alcohol with gaseous ammonia, extricated from a mixture of lime and muriate of ammonia. On the other hand, the London and Dublin formulæ yield preparations in which carbonated ammonia is dissolved in alcohol. In the *London* process a double decomposition takes place between the muriate of ammonia and carbonate of potassa, resulting in the formation of carbonate of ammonia, which distils over with the proof spirit, and muriate of potassa, which remains behind in solution. Part, however, of the carbonate formed sublimes, the proof spirit, notwithstanding the water it contains, not being competent to dissolve the whole which comes over. The *Dublin* process is peculiar, and is characterized by Dr. A. T. Thomson as simple and elegant. It consists in dissolving the officinal carbonate in heated rectified spirit (Alcohol, *U.S.*). The officinal carbonate is a sesquicarbonate, and during its solution in the alcohol in this process, just so much carbonic acid is disengaged with effervescence, as to convert it into the regular carbonate, of which thirty grains dissolve in each fluidounce of the spirit. The preparation thus obtained, therefore, contains the ammonia in the same state in which it exists in that formed by the London process.

Properties. Ammoniated Alcohol, as obtained by the United States and Edinburgh formulæ, is a colourless liquid, of an exceedingly pungent smell and acrid taste. It consists of caustic ammonia dissolved in alcohol. The London and Dublin preparations have the same general properties, but in a milder degree, as they are solutions of carbonated ammonia in the same menstruum. They are more pungent and alkaline than if they contained the sesquicarbonate, as the ammonia present is combined with less carbonic acid than in that carbonate. They are capable, as well as the two former preparations, of dissolving camphor and the volatile oils.

Medical Properties and Uses. These preparations are exceedingly stimulant, especially those of the United States and Edinburgh Pharmacopœias. They are sometimes given in flatulent colic and nervous debility, in doses of from twenty to fifty drops, in two or three tablespoonfuls of water. The stronger preparations, when saturated with camphor, form a very highly stimulating liniment.

Ammoniated alcohol is principally employed for the purpose of forming the class of preparations called *Ammoniated Tinctures.* B.

ALCOHOL AMMONIATUM AROMATICUM. *U.S.* SPIRITU AMMONIÆ AROMATICUS. *Lond., Dub.* TINCTURA AROMATICA AMMONIATA. *Ed.* *Aromatic Ammoniated Alcohol.*

"Take of Ammoniated Alcohol *a pint;* Oil of Rosemary, Oil of Lemons each, *two fluidrachms;* Oil of Cloves, Oil of Cinnamon, each, *half a flu drachm.* To the Oils, previously mixed, add the Ammoniated Alcoho and pour upon them so much water, that, after distillation, sufficient may remain to prevent empyreuma; then, with a gentle heat, distil a pint." *U.S.*

"Take of Cinnamon Bark, bruised, Cloves, bruised, each, *two drachms;* Lemon Peel *four ounces;* Subcarbonate [Carbonate] of Potassa *half a pound;* Muriate of Ammonia *five ounces;* Rectified Spirit *four pints;* Water *a gallon;* Mix, and let six pints be distilled." *Lond.*

"Take of Ammoniated Alcohol *eight ounces;* Volatile Oil of Lemon Peel *a drachm;* Volatile Oil of Rosemary *a drachm and a half;* Mix them, that the Oils may be dissolved." *Ed.*

"Take of Spirit of Ammonia *two pints;* Essential Oil of Lemons *two drachms;* Nutmegs, bruised, *half an ounce;* Cinnamon Bark, bruised, *three drachms.* Macerate in a covered vessel for three days, shaking occasionally; then distil a pint and a half." *Dub.*

These processes all furnish Ammoniated Alcohol, impregnated with volatile oils. In the United States and Dublin formulæ, the ammoniated alcohol is distilled with the aromatics; in the London, the materials for forming it are thus distilled; while the Edinburgh College dissolves the aromatics in the menstruum, without resorting to distillation. The process of the *United States* Pharmacopœia has been found to afford a pleasant preparation. In the *London* process, the carbonate of potassa directed is insufficient to decompose the whole of the muriate of ammonia, the proportions used in the London spirit of ammonia being injudiciously departed from. Four pints of Rectified Spirit are taken, but six pints of product are drawn off: showing that the London preparation is a solution of carbonate of ammonia in *diluted* alcohol, impregnated with aromatics. The *Dublin* preparation is the same, except that the menstruum is undiluted alcohol, or rectified spirit. The *Edinburgh* process is objectionable on account of the omission of distillation; for if the volatile oils contain impurity, the preparation which results will be coloured and turbid, a defect which is avoided by distillation, as the impurities are thus left behind.

Medical Properties and Uses. These preparations, though analogous, are by no means identical, differing considerably in strengh, according as the alcoholic menstruum contains caustic or carbonated ammonia. They are much more used than the preceding preparations, on account of their more grateful taste, derived from the aromatics; but their medical effects are similar. The dose is from twenty to sixty drops, in one or two wineglassfuls of water. They are compatible with sulphate of magnesia, and may be usefully added to aperient draughts of that salt, to render them less offensive to the stomach.

Off. Prep. Tinctura Guaiaci Ammoniata, *U.S.*, *Lond.*, *Dub.;* Tinctura Valerianæ Ammoniata, *U.S.*, *Lond.*, *Dub.* B.

AMMONIÆ CARBONAS. *U.S.*, *Dub.* AMMONIÆ SUBCARBONAS. *Lond.* SUB-CARBONAS AMMONIÆ. *Ed.* *Carbonate of Ammonia. Mild volatile alkali.*

"Take of Muriate of Ammonia *a pound;* Carbonate of Lime, dried, *a pound and a half.* Pulverize them separately; then mix them thoroughly, and sublime from a retort into a receiver kept cold." *U.S.*

"Take of Muriate of Ammonia *one part;* Softer Carbonate of Lime, dried, *two parts.* Having triturated them separately, mix them thoroughly, and sublime from a retort into a refrigerated receiver." *Ed.*

"Take of Muriate of Ammonia, pulverized and well dried, Dried Carbonate of Soda, each, *one part.* Put the mixture into an earthenware retort, and with a heat gradually increased, sublime the Carbonate of Ammonia into a refrigerated receiver." *Dub.*

The *London* differs from the United States process, in ordering the heat to be continued until the retort becomes red hot, and in omitting the refrigeration of the receiver.

In the above processes, by the reciprocal action of the salts employed, the carbonic acid unites with the ammonia, generating carbonate of ammonia, and the muriatic acid with the lime or soda, so as to form water and chloride of calcium, or the same liquid and chloride of sodium. The carbonate and water sublime together as a hydrated carbonate of ammonia, and the residue is chloride of calcium, or, in the case of the Dublin formula, chloride of sodium, or common salt. In conducting this process, the retort should be of earthenware, and have a wide cylindrical neck; and the receiver should be cylindrical, to facilitate the extraction of the sublimate. The relative quantities of chalk and muriate of ammonia for mutual decomposition, are 50.62 of the former and 53.57 of the latter, or one equiv. of each. The different Pharmacopœias, therefore, use a great excess of chalk. A small excess is desirable, to ensure the perfect decomposition of the muriate of ammonia, any redundancy of which would sublime along with the carbonate and render it impure. The employment of carbonate of soda, in the Dublin process, affords a product of greater whiteness, but is objectionable on the score of expense. The proportions of the muriate and alkaline carbonate, directed by this College, correspond precisely with the equivalents; but in practice, the quantity of carbonate of soda is found insufficient.

Carbonate of ammonia is obtained on a large scale, generally by subliming the proper materials from an iron pot, into a large earthen or leaden receiver. Sulphate of ammonia may be substituted for the muriate with much economy, as has been shown by Payen. Large quantities of this carbonate are also manufactured from the products of the distillation of coal in gas works; but the salt thus obtained is apt to have a slight odour of tar, and to leave a blackish carbonaceous matter when dissolved in acids.

Properties. Carbonate of ammonia, recently prepared, is in white, moderately hard, translucent masses, of a fibrous and crystalline appearance, a pungent smell, and a sharp penetrating taste. It possesses an alkaline reaction, and when held under a piece of turmeric paper changes it to brown, owing to the ammonia which escapes. When long or carelessly kept, it gradually passes into the state of bicarbonate, becoming opaque and friable, and much less pungent. It is soluble in about four times its weight of cold water, and is decomposed by boiling water with effervescence of carbonic acid. According to Dr. Barker, (*Observations on the Dublin Pharmacopœia,*) it dissolves abundantly in diluted alcohol; as also in heated alcohol of the sp. gr. 0.836, with effervescence of carbonic acid. When heated on a piece of glass, it ought to evaporate without residue, and if turmeric paper held over it undergoes no change, it is proved to have passed into bicarbonate. It is decomposed by acids, alkalies and their carbonates, lime-water and magnesia, muriate of lime and supertartrate of potassa, the preparations of iron (except the tartrate of iron and potassa), corrosive sublimate, the acetate and subacetate of lead, and the sulphates of iron and zinc.

Composition. It consists, according to Mr. Philips, of three equiv. of carbonic acid 66.36, two of ammonia 34.3, and two of water 18=118.66; or which comes to the same thing, of one equiv. of bicarbonate 61.39, and one of the regular carbonate 39.27, combined with the same quantity of water. The medicinal carbonate of ammonia, when perfect, is, therefore, a hydrated *sesquicarbonate*, and not a subcarbonate, as called by the London and Edingburgh Colleges. When converted into bicarbonate by exposure to the air, every two equiv. of it may be supposed to lose one equiv. of ammonia, a change which would leave the acid and base in the proper proportion to form the bisalt. The mutual decomposition of the salts employed in its preparation, would generate, if no loss occurred, the regular carbonate, and not a sesquicarbonate. The way in which the latter salt is formed may be thus explained. By the mutual decomposition of three equiv. of muriate of ammonia and of chalk respectively, three equiv. of carbonate of ammonia, three of water, and three of chloride of calcium would be generated. During the operation, one equiv. of ammonia and one of water are lost; so that there remain to be sublimed, three equiv. of carbonic acid, two of ammonia, and two of water, or in other words, the exact constituents of the hydrated sesquicarbonate.

Medical Properties and Uses. Carbonate of ammonia is stimulant, diaphoretic, antispasmodic, powerfully antacid, and in large doses emetic. Under certain circumstances it may prove expectorant; as when, in the last stages of phthisis, it facilitates, by increasing the muscular power, the excretion of the sputa. As a stimulant, it is exhibited principally in typhus fever, and very frequently in connexion with wine whey. Its principal advantage in this disease, is its power to increase the action of the heart and arteries, without unduly exciting the brain. It is employed, with a view to the same effect, and as an antacid, in certain states of atonic gout, and in the derangements of the stomach supervening on habits of irregularity and debauchery. As a diaphoretic, it is resorted to in gout and chronic rheumatism, particularly the latter, in conjunction with guaiac. It is very seldom used as an emetic; but is said to act with advantage, in this way, in some cases of paralysis. As an external application, it is rubefacient, and may be employed in several ways. Reduced to fine powder, and mixed with some mild ointment, it is useful in local rheumatism. One part of it, incorporated with three parts of extract of belladonna, forms a plaster very efficacious in relieving local and spasmodic pains. Coarsely bruised, and scented with oil of lavender, it constitutes the common smelling salts, so much used as a nasal stimulant in syncope and hysteria. The dose as a stimulant, is from five to ten grains, every two, three, or four hours, in the form of pill, or dissolved in some aqueous vehicle; and as an emetic, thirty grains, to be repeated if necessary, and assisted by free dilution. It should never be given in powder, on account of its volatile nature. Pills of it may be made up with some vegetable extract, as of chamomile for example, and should be dispensed in a wide mouthed phial, and not in a box.

Off. Prep. Cuprum Ammoniatum, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Liquor Ammoniæ Acetatis, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Liquor Ammoniæ Subcarbonatis, *Lond.*, *Ed.*, *Dub.;* Spiritus Ammoniæ, *Dub.* B.

LIQUOR AMMONIÆ SUBCARBONATIS. *Lond.* SOLUTIO SUB-CARBONATIS AMMONIÆ. *Ed.* AMMONIÆ CARBONATIS AQUA. *Dub.* *Solution of Subcarbonate of Ammonia.*

"Take of Subcarbonate of Ammonia *four ounces*, [one part, *Ed.*]; Distilled Water *a pint*, [four parts, *Ed.*]. Dissolve the Subcarbonate of Ammonia in the Water, and filter through paper." *Lond.*

"Take of Carbonate of Ammonia *four parts;* Distilled Water *fifteen parts.* Dissolve the Carbonate of Ammonia in the Water, and filter through paper. The specific gravity of the solution is 1.090." *Dub.*

This preparation may be viewed as a saturated aqueous solution of carbonate of ammonia, the proportions employed being but slightly different, as directed by the different Colleges. It is very properly omitted in the United States Pharmacopœia, as it is liable to change by keeping. The dose is from half a fluidrachm to a fluidrachm, given in any bland liquid.

Off. Prep. Ammoniæ Bicarbonas, *Dub.;* Linimentum Ammoniæ Subcarbonatis, *Lond.* B.

AMMONIÆ BICARBONAS. *Dub.* *Bicarbonate of Ammonia.*

"Take of Water of Carbonate of Ammonia *any quantity.* Expose it, in a suitable apparatus, to a stream of carbonic acid gas, evolved during the solution of white marble in Diluted Muriatic Acid, until the alkali is saturated. Then let it rest to form crystals, which are to be dried without heat, and kept in a closely stopped vessel." *Dub.*

This salt has been made officinal in the last revision of the Dublin Pharmacopœia, and is peculiar to that work. The process by which it is formed consists in saturating the sesquicarbonate (officinal carbonate) with carbonic acid, whereby this salt becomes a bicarbonate. The sesquicarbonate consists of three equiv. of acid, two of ammonia, and two of water; and, by gaining one equiv. of carbonic acid, becomes a bicarbonate, consisting of four equiv. of acid, two of ammonia, and two of water. These proportions reduced to their lowest terms give for the composition of this bisalt, two equiv. of carbonic acid, one of ammonia, and one of water. The above is the rationale of the formation of this salt given by Dr. Barker, the Commentator on the Dublin Pharmacopœia; but it is probable that the bicarbonate obtained by the Dublin process, as it is crystallized from solution, contains more than one equiv. of water.

Bicarbonate of ammonia, as prepared by this process, is in the form of crystals, which are much less ammoniacal in taste and smell, and more permanent in the air, than the sesquicarbonate. It is also less soluble in water, requiring eight times its weight of that liquid to dissolve it. It possesses, though in an inferior degree, the medical properties of the sesquicarbonate. As it furnishes the practitioner with the means of prescribing ammonia in a convenient and palatable form, Dr. Barker deems its introduction into the officinal list of the Dublin College, a valuable improvement. It ought to have been shown, however, in what respect the Dublin preparation differs from the bicarbonate, obtained by exposing the sesquicarbonate to the air; for if they be identical, it cannot be necessary to resort to the Dublin formula for preparing this bisalt. The dose of bicarbonate of ammonia is from six to twenty-four grains, dissolved in cold water, as hot water decomposes it. B.

AQUA AMMONIÆ. *U.S.*, *Ed.* LIQUOR AMMONIÆ. *Lond.* AMMONIÆ CAUSTICÆ AQUA. *Dub.* *Water of Ammonia.*

"Take of Muriate of Ammonia, in very fine powder, *a pound*; Lime, recently burnt, *a pound and a half*; Distilled Water *a pint*; Water *nine fluidounces.* Break the lime in pieces, and pour the Water upon it, in an earthen or iron vessel; then cover the vessel, and set it aside till the Lime falls into powder, and becomes cold. Mix this thoroughly with the Muriate of Ammonia in a mortar, and immediately introduce the mixture into a glass retort. Place the retort upon a sand-bath, and adapt to it a receiver, previously connected, by means of a glass tube, with a quart bottle containing the Distilled Water. Then apply heat, to be gradually increased till the bottom of the iron vessel containing the sand becomes red hot; and continue the process so long as the Ammonia comes over. Remove the liquor contained in the quart bottle, and preserve it in small phials well stopped. The specific gravity of Water of Ammonia is 0.944." *U.S.*

"Take of Muriate of Ammonia *eight ounces;* fresh Lime *six ounces;*

Water *four pints.* Pour a pint of the Water upon the Lime; then cover the vessel, and set it aside for an hour. Next add the Muriate of Ammonia and the rest of the Water previously heated to ebullition, and again cover the vessel. Strain the liquor after it has become cold, and distil from it twelve fluidounces of Solution of Ammonia into a receiver, the temperature of which does not exceed 50°. The specific gravity of Solution of Ammonia is 0.960." *Lond.*

"Take of Muriate of Ammonia, in powder, *three parts;* Lime, recently burnt, *two parts;* Water *ten parts.* Pour one part of the Water, previously heated, on the Lime, placed in an earthen vessel, and cover it. Dissolve the salt in the remainder of the Water, also heated. When the lime has fallen into powder and become cool, put it into a retort, and add to it the saline solution also cold. Then distil five parts with a medium heat into a refrigerated receiver. The specific gravity of this Solution is 0.950. *Dub.*

The *Edinburgh* process for this preparation is nearly the same with that of the U.S. Pharmacopœia; the latter having been copied from the former, with the unimportant differences of substituting a pint of distilled water for a pound, and nine fluidounces of water for nine ounces, changes which cause the U.S. preparation to be somewhat weaker than the Edinburgh, which has the sp. gr. 0.939.

The object of the above processes is to obtain an aqueous solution of the alkaline gas ammonia. The muriate of ammonia is decomposed by the superior affinity of the lime for its acid, ammonia is disengaged, and the lime combining with the acid, forms chloride of calcium and water. The ammonia is either evolved from the dry materials, and passed into water, by which it is absorbed, as in the U.S. and Edinburgh processes, or distilled over in connexion with water, as directed by the London and Dublin Colleges. The lime is required to be recently burnt, to ensure its causticity; for if partly carbonated, it would give rise to a portion of carbonate of ammonia. It is slaked to render it pulverulent, in which state, it acts more readily on the finely pulverized muriate of ammonia. The receiver directed in the *United States* process is intended to retain any water holding in solution undecomposed muriate, or oily matter sometimes contained in this salt, which may be driven over by the heat; while the pure gas passes forward through the glass tube into the bottle containing the distilled water, which should not more than half fill it, on account of the increase of bulk which it acquires during the absorption of the gas. The tube should continue down to near the bottom of the bottle, and pass through a cork, which loosely fits its mouth. To prevent the regurgitation of the water from the bottle into the receiver, the latter should be furnished with a Welter's tube of safety. Large bottles are improper for keeping the water of ammonia obtained; as when partially empty, the atmospheric air contained within them is apt to furnish some carbonic acid to the ammonia.

In the *London* process, a boiling solution of muriate of ammonia being added to the slaked lime, the decomposition of the muriate takes place before the distillation is commenced, and results in the extrication of ammonia which dissolves in part of the water, and in the formation of muriate of lime in solution. An excess of lime being used, the object of straining is to separate it, and, consequently, the clear liquid contains nothing but the mixed solutions of ammonia and of muriate of lime. When subjected to distillation, so as to draw off a limited portion of liquid, the solution of ammonia comes over, and the muriate of lime is left behind dissolved in the larger part of the water. The receiver is not allowed to exceed the temperature of 50°, in order to prevent the loss of gas which the high temperature of the product might occasion. The principle of the *Dublin* process is the same as that of the London. The difference consists in dispensing with the straining, so that the residue of the operation consists of the solution of muriate of lime, mixed with the superabundant lime. Dr. Barker objects to the Dublin formula that the ammonia is apt to be generated in the retort faster than the water present can take it up, which circumstance causes a loss. He, therefore, believes it would be an improvement in the formula to direct that part of the water should be placed in the receiver.

The proportion of lime is very different, as used in the different formulæ. The equivalent proportions are 53.57 of salt to 28.5 of lime; or a quantity of the latter only a little more than half the weight of the former. By the numbers expressing the proportions of the ingredients employed, it is shown, therefore, that all the Pharmacopœias use an excess of lime, the excess being least in the Dublin. The earth is particularly in excess in the U.S. and Edinburgh processes, and Mr. Phillips alleges that its bulk is an inconvenience by requiring large vessels; but Dr. Hope contends that the excess of lime is useful by accelerating the disengagement of the ammonia, and by rendering a less elevated temperature necessary. The excess of lime, to the extent directed by the Dublin College, is stated by Dr. Barker to be necessary to compensate for the impurities in ordinary lime. The use of no more lime than is absolutely required, has the incidental advantage of rendering the residual solution of muriate of lime less impure; an object of some importance where it is reserved for purification, as is done by the Dublin College.

Water of ammonia is usually prepared in large quantities by the manufacturing chemist. To save the expense of glass or earthenware retorts, a cast iron boiler is employed, furnished with a copper head, which communicates with glass receivers, arranged as already explained. The materials being placed in the boiler, the head is luted on with a mixture of lime and white of eggs. This apparatus, according to Thenard, offers the advantages of allowing considerable quantities of the materials to be operated on at a time, and of permitting an admixture of water, which, by bringing the lime to a pasty consistence, facilitates remarkably the decomposition of the muriate. When a strong water of ammonia is required, the water employed to absorb the gas should equal in weight the muriate decomposed. The manufacturing chemists generally obtain a very strong solution, and afterwards reduce it to the medicinal standard, as ascertained by its specific gravity, by the addition of the requisite portion of water. Sulphate of ammonia may be used in this process, instead of the muriate, as proposed by Payen, with economical results.

Properties. Water of ammonia is a colourless liquid, of a caustic, acrid taste, and peculiar, pungent smell. It is strongly alkaline, and immediately changes turmeric to reddish-brown, when held over its fumes. When concentrated, it blisters the tongue and skin. Cooled down to 40° below zero, it concretes into a gelatinous mass, and at the temperature of 130°, enters into ebullition, owing to the rapid disengagement of the gas. It possesses a very strong affinity for carbonic acid, and when insecurely kept, attracts it from the atmosphere. When pure, it evaporates in a glass capsule without residue. The presence of carbonic acid may be detected by its effervescing with acids, and affording a precipitate when poured into lime-water. It unites with oils forming a liquid soap, and dissolves resins and many other vegetable principles. Its sp. gr. is in an inverse proportion to its strength. When as concentrated as possible, it weighs 0.875 at the temperature of 50°. Its sp. gr. in its various officinal states has been already indicated. It is incompatible with all the acids, and with most of the earthy and metallic salts.

Composition. Water is capable of absorbing a third of its weight, or 430 times its volume of ammoniacal gas, and increases in bulk about two-thirds. But the officinal water of ammonia is by no means saturated. Thus the percentage of ammonia contained in the preparations of the different Pharmacopœias is nearly as follows:—London 10 per cent.; Dublin 12½; U. S. 14½; and Edinburgh 15.8. The following table, constructed by Sir H. Davy, gives the percentage of ammoniacal gas in aqueous solutions of different specific gravities.

Specific Gravity.	Ammonia per cent.	Specific Gravity.	Ammonia per cent.	Specific Gravity.	Ammonia per cent.
0.8750	32.50	0.9326	17.52	0.9545	11.56
0.8875	29.25	0.9385	15.88	0.9573	10.82
0.9000	26.00	0.9435	14.53	0.9597	10.17
0.9054	25.37	0.9476	13.46	0.9619	9.60
0.9166	22.07	0.9513	12.40	0.9692	9.50
0.9255	19.54				

Properties of Gaseous Ammonia. All the ammoniacal compounds owe their distinctive properties to the presence of a peculiar gaseous compound of hydrogen and nitrogen, called ammonia. It is most easily obtained by the action of lime upon muriate of ammonia. It is transparent and colourless like common air, but possesses an acrid and hot taste, and an exceedingly pungent smell. It has a powerful alkaline reaction, and from its gaseous nature, was called the *volatile alkali* by the earlier chemists. Its sp. gr. is 0.59. It is irrespirable, the glottis closing spasmodically when the attempt is made to breathe it. It consists of one equiv. of nitrogen 14.15, and three of hydrogen 3=17.15; or in volumes, of one volume of nitrogen and three volumes of hydrogen, condensed into two volumes.

Medical Properties and Uses. Water of ammonia is stimulant, antacid, and rubefacient. It is rarely used internally, other ammoniacal preparations being preferred, the dose of which is larger and more easily managed. As a stimulant, it is occasionally employed in paralysis, hysteria, syncope, asphyxia, and similar affections, with a view to rouse the vital powers. In the same complaints it is often applied to the nostrils with advantage. As an antacid, it is one of the best remedies in heartburn, and for the relief of sick headach, when dependent on acidity of stomach. In these cases it acts usefully also as a stimulant. Externally applied, it may be made to act either as a rubefacient or vesicatory. As a rubefacient it is employed united to oil in the form of volatile liniment. (See *Linimentum Ammoniæ.*) As a vesicatory, it is applied by means of a piece of linen wet with it. The dose is from five to twenty drops, largely diluted with water to prevent its caustic effect on the mouth and throat. In graduating the dose, the particular officinal preparation employed must be taken into the account; as these differ considerably in strength. It is on account of the high strength of the water of ammonia of the Edinburgh College, considered as a medicine, that a diluted preparation is directed by that College under a separate name. (See *Aqua Ammoniæ Diluta*, Ed.) When swallowed in an over-dose, its effects are those of a corrosive poison. The best antidote that can be used is vinegar, which acts by neutralizing the ammonia, and which must be promptly applied to be useful. The consecutive inflammation must be treated on general principles.

Water of ammonia is used pharmaceutically, as a precipitant, in preparing morphia (*U.S.*), the precipitated phosphate of lime (*Dub.*), and the oxide of zinc (*U.S.*, *Lond.*)

Off. Prep. Aqua Ammoniæ Diluta, *Ed.;* Hydrargyri Submurias Ammoniatum, *Dub.;* Linimentum Ammoniæ, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Linimentum Camphoræ Compositum, *Lond.*, *Dub.;* Linimentum Hydrargyri, *Lond.;* Liquor Ammoniæ Hydrosulphatis, *U.S.*, *Ed.*, *Dub.;* Spiritus Ammoniæ Succinatus, *Lond.* B.

AQUA AMMONIÆ DILUTA. *Ed. Diluted Water of Ammonia.*

"Take of Water of Ammonia *one part;* Distilled Water *two parts.* Mix them." *Ed.*

The Edinburgh College, considering their water of ammonia to be inconveniently if not dangerously strong for internal exhibition, have directed this formula for its dilution. It is true that the strong preparation is always diluted at the moment it is taken; but the objection to it still holds, that it is exceedingly pungent, and its dose, being only a few drops, is not so convenient to apportion, and may be given by mistake, unduly concentrated. This preparation is, of course, one-third of the strength of the strong water of ammonia of this College, or will contain about 5.3 per cent. of ammonia. Its dose is from fifteen to thirty drops, sufficiently diluted with water. B.

LIQUOR AMMONIÆ ACETATIS. *U. S., Lond.* AQUA ACETATIS AMMONIÆ. *Ed.* AMMONIÆ ACETATIS AQUA. *Dub. Solution of Acetate of Ammonia. Spirit of Mindererus.*

"Take of Diluted Acetic Acid *a pint;* Carbonate of Ammonia, in powder, *a sufficient quantity.* Add the Carbonate of Ammonia gradually to the Acid, stirring constantly, until effervescence ceases." *U.S.*

"Take of Subcarbonate of Ammonia *two ounces;* Diluted Acetic Acid [Distilled Vinegar] *four pints*, or *a sufficient quantity.* Add the Acid to the Subcarbonate of Ammonia, until effervescence ceases, and mix." *Lond.*

"Take of Sub-Carbonate of Ammonia, in powder, *any quantity;* Weak Acetic Acid [Distilled Vinegar] *a sufficient quantity.* Add the Acid gradually until the Sub-Carbonate is accurately saturated." *Ed.*

"Take of Carbonate of Ammonia *one part.* Add gradually, and with frequent agitation, as much warm Distilled Vinegar as may be necessary to saturate the ammonia, namely, about *thirty parts.* The saturation may be ascertained by means of litmus." *Dub.*

This preparation is an aqueous solution of acetate of ammonia. The process by which it is formed constitutes a case of single elective affinity. The acetic acid decomposes the carbonate, combines with the ammonia, forming the acetate of ammonia, and disengages the carbonic acid, the escape of which causes the effervescence. The British Colleges employ distilled vinegar, while, according to the United States Pharmacopœia, the saturation is effected with a pure acetic acid, diluted to a determinate extent with water. (See *Acidum Aceticum Dilutum*, U. S.) The use of the acid in the latter form is a decided improvement; for besides furnishing the solution of the acetate of uniform strength, a result which cannot be attained by the employment of distilled vinegar, it avoids the production of a brownish solution, which uniformly follows the use of the latter, especially when it has been condensed in a metallic worm. The quantity of carbonate of ammonia necessary to saturate a given weight of the acid of average strength, cannot be laid down with precision, on account of the variable quality of this salt. When the acid is of the sp. gr. 1.009, Mr. Philips found a pint of it to require for saturation within a few grains of seven drachms. The addition of the salt to the acid, as directed in the U. S. Pharmacopœia, is more convenient than the contrary order; as the point of saturation is thus more easily attained. This point is best ascertained by the alternate use of turmeric and litmus paper; and it is a good rule to allow rather a slight acidity to prevail, which will be due to carbonic acid dissolved in the liquid, and will disappear as soon as this acid is dissipated by time.

Properties. Solution of acetate of ammonia, when made of pure materials, is a limpid and nearly colourless liquid. Its taste is saline and resembles that of a mixture of nitre and sugar. It should not be made in large quantities at a time, as its acid becomes decomposed, and a portion of carbonate of ammonia is generated. As formerly prepared, under the name of *spiritus Mindereri*, it was made from the impure carbonate of ammonia, containing animal oil, which modified the product by giving rise to a portion of ammoniacal soap. It is incompatible with acids, the fixed alkalies and their carbonates, lime-water, magnesia, sulphate of magnesia, corrosive sublimate, the sulphates of iron, copper, and zinc, and nitrate of silver. When it contains free carbonic acid, it produces with the acetate or subacetate of lead, a precipitate of carbonate of lead, which being mistaken for the sulphate, has sometimes led to the erroneous supposition of the presence of sulphuric acid in the distilled vinegar, when this has been employed. Acetate of ammonia, the salt in solution in this preparation, is difficultly crystallizable, and very deliquescent. It may be obtained by sublimation, from a mixture of equal parts of dry acetate of potassa or of lime, and muriate of ammonia. It consists of one equiv. of acetic acid 51.48, and one of ammonia 17.15=68.63. When crystallized it contains seven equiv. of water 63.

Medical Properties and Uses. Solution of acetate of ammonia is a valuable diaphoretic, much employed in febrile and inflammatory diseases. According to the indications to be answered by its use, it is variously combined with nitre and antimonials, camphor and opium. If, instead of promoting its determination to the skin by external warmth, the patient walk about in a cool air, its action will be directed to the kidneys. It is sometimes used externally as a discutient. Mr. Brande speaks of it as an excellent application in mumps, applied hot upon a piece of flannel. Mixed in the proportion of a fluidounce with seven fluidounces of rose-water, and two fluidrachms of laudanum, it forms a useful collyrium in chronic ophthalmia. Dr. A. T. Thomson has used it as a lotion with the best effect in a case of porrigo affecting the scalp. The dose is from half a fluidounce to a fluidounce and a half, every three or four hours. It proves sometimes very grateful to febrile patients, when mixed with an equal measure of carbonic acid water.

B.

LIQUOR AMMONIÆ HYDROSULPHATIS. *U.S.* HYDRO-SULPHURETUM AMMONIÆ. *Ed.* AMMONIÆ HYDROSULPHURETUM. *Dub.* *Solution of Hydrosulphate of Ammonia. Hydrosulphuret of Ammonia.*

"Take of Water of Ammonia *four fluidounces.* Pass Hydrosulphuric Acid through the Water of Ammonia, in a suitable vessel; to perfect saturation. Let the solution be kept in a well stopped bottle.

"Hydrosulphuric Acid is obtained from the Sulphuret of Iron, and Sulphuric Acid diluted with four times its weight of water." *U.S.*

"Take of Water of Ammonia, Sulphuret of Iron, each, *four ounces;* Muriatic Acid *eight ounces;* Water *two pounds and a half.* Pour the Acid, previously mixed with the Water, upon the Sulphuret, and pass the Gas extricated from them through the Water of Ammonia. Keep the solution in a phial, very well stopped." *Ed.*

"Take of Sulphuret of Iron, in coarse powder, *five parts;* Sulphuric Acid *seven parts;* Water *thirty-two parts;* Water of Caustic Ammonia *four parts.* Put the Sulphuret into a retort; then gradually pour on the Acid, previously diluted with the Water, and in a suitable apparatus, transmit the gas evolved through the Water of Ammonia. Towards the end of the process, apply a gentle heat to the retort." *Dub.*

This preparation is a solution of hydrosulphate of ammonia in water, and is formed by passing a stream of hydrosulphuric acid gas (sulphuretted hydrogen) through a portion of water of ammonia, usually contained in a Wolfe's bottle. In the United States and Dublin processes, the hydrosulphuric acid is generated by the action of dilute sulphuric acid on sulphuret of iron. The water yields its oxygen to the iron forming protoxide of iron, with which the sulphuric acid combines; while the hydrogen of the water, uniting with the sulphur, gives rise to the hydrosulphuric acid. In the Edinburgh formula, the same acid is formed by the action of dilute muriatic acid on sulphuret of iron; in which case the rationale is similar to the above, the only difference being that the residual salt is a muriate instead of a sulphate of iron. In the Edinburgh and Dublin processes, the ingredients, in certain specified quantities, for producing the hydrosulphuric acid, are enumerated in the formula; in the United States process, the mode of obtaining it is explained in a general way in an appended paragraph. In the two former processes, the gas extricated from the given weight of ingredients is supposed to be all absorbed by the water of ammonia; in the latter, the limit to the generation of the gas is the accomplishment of the complete saturation of the alkali, which is the better rule. Sulphuric acid is to be preferred to muriatic acid for extricating the gas, as well on account of its cheapness, as of its fixed nature, which makes it less liable than muriatic acid to come over and contaminate the product.

Properties. Solution of hydrosulphate of ammonia is a liquid of a greenish-yellow colour, very fetid smell, and acrid and disagreeable taste. It is characterized by giving coloured precipitates with neutral metallic solutions, for which it is much used as a test. It is decomposed by acids, which cause the escape of hydrosulphuric acid with effervescence, and the deposition of sulphur.

Medical Properties and Uses. This preparation acts on the system as a powerful sedative, lessening the action of the heart and arteries in a remarkable degree, and producing nausea and vomiting, vertigo, and drowsiness. It has been used in diabetes mellitus, in which disease it was proposed as a remedy by Mr. Cruickshank, for the purpose of lessening the morbid appetite, which often attends that affection, and has been employed by Dr. Rollo and others. The dose is from five to six drops in a tumblerful of water three or four times a day, to be gradually increased until giddiness is produced. B.

ANTIMONIUM.

Preparations of Antimony.

ANTIMONII OXYDUM NITROMURIATICUM. *Dub. Nitromuriatic Oxide of Antimony. Powder of Algaroth.*

"Take of Prepared Sulphuret of Antimony *twenty parts;* Muriatic Acid *one hundred parts;* Nitric Acid *one part.* Add the Sulphuret gradually to the Acids, previously mixed in a glass vessel, avoiding the vapours. Digest with a heat gradually increased, until the effervescence cease, and then boil for an hour. Receive the cooled and filtered liquor in a gallon of water. Wash the Oxide of Antimony, after it has subsided, repeatedly, in a sufficiently large quantity of water, until the liquid poured off be perfectly free from acid, as known by the test of litmus. Lastly, dry the oxide on bibulous paper."

The object of this process is to obtain the oxy-chloride of antimony, consisting of sesquioxide and sesquichloride of antimony, formerly called *powder of Algaroth.* When sulphuret of antimony is dissolved by the aid of heat, in muriatic acid, a double decomposition takes place, resulting in the formation of sesquichloride of antimony (butter of antimony) and hydrosulphuric acid (sulphuretted hydrogen), which by its evolution causes the effervescence. When the sesquichloride is poured into a large quantity of water, part of it is converted into muriatic acid and sesquioxide, the former remaining in solution united with the major part of the undecomposed sesquichloride, the latter falling in union with a small portion of the same chloride, as a white flocculent precipitate, constituting the oxy-chloride, or powder of Algaroth. The precipitate is washed for the purpose of freeing it from adhering muriatic acid. The heat should be applied moderately at first, for fear the materials should unduly swell; but towards the close of the process it ought to be increased, to ensure the complete action of the acid. The small portion of nitric acid used by the College, is not essential to the success of the process; but is useful for decomposing any remains of hydrosulphuric acid which may exist in the solution, and which, by its presence, would impair the whiteness of the oxy-chloride, when precipitated in the next step of the process by the water. The employment of nitric acid, for the purpose of giving whiteness to the product of this formula, originated with Dr. Perceval of Dublin. There exists a defect in the formula; inasmuch as the ingredients are taken in parts, which are *relative* quantities, while the water is directed in the *absolute* quantity of a gallon.

Properties. Oxy-chloride of antimony is in the form of a white powder. When exposed to a red heat, it enters into fusion, and forms a yellow liquid, which, on cooling, concretes into a grayish crystalline mass, of a pearly aspect. It consists mainly of sesquioxide, containing only, according to Phillips, about 8 per cent. of chlorine.

Medical Properties and Uses, &c. Powder of Algaroth was formerly used in medicine, but, owing to its unequal operation, has been laid aside. It is employed in pharmacy in the preparation of tartar emetic, for which purpose it is placed among the preparations of the Dublin Pharmacopœia. It is also applied to the same use in the United States Pharmacopœia, but without being recognised under a distinct name, being formed as one step of the process adopted in that work for preparing tartar emetic. The name given to this oxide by the Dublin College is very exceptionable. It is not formed on correct chemical principles; neither has it any pharmaceutical convenience to recommend it.

Off. Prep. Antimonii et Potassæ Tartras, *Dub.* B.

ANTIMONII ET POTASSÆ TARTRAS. *U.S.* ANTIMONII ET POTASSÆ TARTRAS sive TARTARUM EMETICUM. *Dub.* ANTIMONIUM TARTÁRIZATUM. *Lond.* TARTRAS ANTIMONII. *Ed.* *Tartrate of Antimony and Potassa. Tartarized Antimony. Emetic Tartar.*

"Take of Prepared Sulphuret of Antimony *two ounces;* Muriatic Acid *twelve ounces and a half:* Nitric Acid *a drachm;* Water *a gallon.* Having mixed the acids together in a glass vessel, add by degrees the Sulphuret of Antimony, and digest the Mixture, with a gradually increasing heat, till effervescence ceases; then boil for an hour. Filter the liquor when it is cold, and pour it into the water. Wash the precipitated powder frequently with water, till it is entirely freed from acid, and then dry it. Take of this powder *two ounces;* Supertartrate of Potassa, in very fine powder, *two ounces and a half;* Distilled Water *eighteen fluidounces.* Boil the Water in a glass vessel; then add the powders, previously mixed together, and boil for half an hour: lastly, filter the liquor through paper, and set it aside to crystallize." *U.S.*

"Take of Nitromuriatic Oxide of Antimony *four parts;* Bitartrate of Potassa, in very fine powder, *five parts;* Distilled Water *thirty-four parts.* Boil the Water in a glass vessel; then gradually throw into it the Oxide and Bitartrate of Potassa, previously mixed, and boil for half an hour; then filter the liquor through paper, and crystallize by slow cooling." *Dub.*

"Take of Glass of Antimony, in very fine powder, Supertartrate of Potassa, each, *a pound;* boiling Distilled Water *a gallon.* Mix the Glass of Antimony and the Supertartrate of Potassa intimately together, and throw the mixture by degrees into the boiling Distilled Water, stirring constantly with a rod. Boil the whole for a quarter of an hour, and set it aside. Filter it when cold, and evaporate the filtered liquor, that crystals may form." *Lond.*

"Take of Sulphuret of Antimony and Nitrate of Potassa *equal weights;* Supertartrate of Potassa *a sufficient quantity.* Powder the Sulphuret and Nitrate separately, and having mixed them thoroughly, throw them into a red-hot crucible. When the deflagration is finished, separate the reddish matter obtained from the white crust, and rub it into a very fine powder, which is to be washed with abundance of warm water, and then dried. Mix this powder, by trituration, with *an equal weight* of Supertartrate of Potassa, and boil the mixture in a glass vessel, with four times its weight of Distilled Water, for an hour; then filter through paper, and evaporate the filtered liquor, so that crystals may form." *Ed.*

This preparation is a double salt, consisting of the tartrate of potassa, united with the tartrate of the sesquioxide of antimony. The principle of its formation is exceedingly simple, being merely the saturation of the excess of acid in the bitartrate of potassa (cream of tartar), with sesquioxide of antimony. The various officinal processes for its preparation all agree in boiling cream of tartar with some form of antimonial sesquioxide, and only differ in the particular one selected, and in some minor details of manipulation. The United States Pharmacopœia, following the Dublin, employs the oxy-chloride, (*nitromuriatic oxide*, Dub.) while the London College uses the *glass of antimony*, and the Edinburgh the *crocus.* The nitromuriatic oxide and glass have been described under other heads, to which the reader is referred for their mode of preparation and properties. (See *Antimonii Oxydum Nitromuriaticum*, and *Antimonii Vitrum.*) In the Edinburgh formula for tartar emetic, the crocus is formed in the first part of the process, and, not being prepared by a separate formula, will be described in this place. It is generated during the deflagration of the sulphuret of antimony and nitrate of potassa. The nitric acid of the nitre is decomposed, and by furnishing oxygen to part of the sulphuret, converts its constituents into sulphuric acid and sesquioxide of antimony. The sulphuric acid then combines with the potassa of the nitre, to form sulphate of potassa, while the sesquioxide unites with the undecomposed portion of the sulphuret, to constitute the crocus. The white crust mentioned in the formula as rejected, consists of the sulphate of potassa formed as above. *Crocus of antimony* is in the form of a liver-brown opaque vitrified mass. When too little nitre has been used in its preparation, it is steel-gray. It consists, according to Proust, of three parts of sesquioxide of antimony, and one of sulphuret; and agrees, therefore, with glass of antimony, in being a mixture of sesquioxide and sulphuret, though containing a smaller proportion of the former.

In the first part of the United States formula, directions are given for procuring the Dublin nitromuriatic oxide of antimony, a preparation not recognised under a distinct name, nor obtained by a separate process, in our national Pharmacopœia. The directions are nearly the same as those of the Dublin College, the acids being employed in the same proportions; but the quantity of sulphuret of antimony is less in the United States process, in the proportion of sixteen to twenty. The latter part of the formula is an exact transcript, as to the quantities taken, of the process of the former Dublin Pharmacopœia, which, with the exception of a slight difference in the amount of water, is adopted in the revision of that work in 1826. Thus the proportions of the United States formula are, nitromuriatic oxide 2 ounces, cream of tartar $2\frac{1}{2}$ ounces, water 18 fluidounces. Now 18 fluidounces of water weigh almost precisely 17 ounces. Substituting this weight, the proportions are as 2, $2\frac{1}{2}$, and 17, or when doubled, 4, 5, and 34, which are the identical numbers used in the Dublin formula. Assuming then the United States and Dublin formulæ as identical, the following table will represent the proportions in which the materials for making tartar emetic are employed in the four Pharmacopœias noticed in this work. The measured portion of water of the London process is converted into its equivalent weight; and the amount of antimonial oxide is assumed at the common quantity of four parts in each formula.

Authority.	Form of Sesquioxide employed.	Proportion of Sesquioxide.	Proportion of Cream of Tartar.	Proportion of Water.
U.S. & Dublin Pharm.	Nitromuriatic oxide.	4	5	34
London Pharm.	Glass.	4	4	40
Edinburgh Pharm.	Crocus.	4	4	32

The U. S. and Dub. Pharmacopœias direct the ebullition to be continued for half an hour, filter the solution while hot, and, without concentration, set it aside to crystallize. The London College boils for a quarter of an hour, and filters the solution when cold. The Edinburgh College boils for an hour, and filters while hot. Both these Colleges evaporate to crystallize.

In judging of the relative eligibility of these processes, several circumstances are to be taken into view; such as the proportions employed, the length of the ebullition, and the relative advantages of the antimonial oxide selected. The cream of tartar ought not to be in excess; as in this case it is apt to crystallize upon cooling with the tartar emetic. To avoid such a result it is better to have a slight excess of antimonial oxide. Upon inspecting the table just given, it would appear that the oxide is most deficient in the U.S. and Dublin formulæ; but in making the comparison, it must be recollected that the nitromuriatic oxide used in them is the sesquioxide of antimony nearly pure; while the glass and crocus contain a considerable quantity of sulphuret. Mr. Phillips, indeed, recommends that the glass in the London formula should be increased one-tenth; while on the other hand, we are assured by Dr. Barker that the proportions of the Dublin (U. S.) formula furnish a slight excess of antimonial oxide. No other rule is applicable to the proportion of the water, except that it should be sufficient to dissolve the tartar emetic formed. The London Pharmacopœia employs the largest quantity of water, and filters when cold; and perhaps it is sufficient, at common temperatures, to retain in solution all the tartar emetic formed. The hot filtration directed by the other Pharmacopœias may be performed conveniently by means of the tin apparatus of Dr. Hare, for filtering liquors at the point of ebullition. (*See p. 692, where this apparatus is figured.*) Here the proportion of water is smaller; and if attention were not paid to preserving the heat of the liquid while filtering, it would be apt to crystallize in the paper. Mr. Phillips very justly objects to the time prescribed for the ebullition in the London process as too short; and an hour, the period directed by the Edinburgh College, is unnecessarily long. Half an hour, the time ordered in the U. S. and Dub. formulæ, is, perhaps, a proper medium. But whenever any of these officinal processes which direct concentration are repeated on a small scale, it is necessary to supply the water which is lost by evaporation; otherwise the liquor will inevitably crystallize in the filter. In all cases, the salt should be obtained in well defined crystals, unmixed with those of cream of tartar, as the best index of its purity. The practice of some manufacturing chemists, therefore, of boiling the filtered liquor to dryness, whereby an impure mass is obtained, consisting in part only of the antimonial salt, is very reprehensible.

Though the glass of antimony will furnish good tartar emetic, yet there are several objections to its use. Thus it always contains as impurity, about five per cent. of silica, and a small portion of peroxide of iron. Besides, it is sometimes mixed with glass of lead, an adulteration which is not easily detected by the eye. Even if it be obtained of good quality, it requires to be finely levigated; or it will only partially unite with the cream of tartar, as was pointed out by Mr. Phillips. The principal objection to the crocus, is that it is not easily obtained in the shops of good quality; and even when properly prepared, as by the formula of the Edinburgh College, it requires to be levigated and elutriated to make it readily unite with the cream of tartar. The use of the nitromuriatic oxide is liable to none of these objections, and to no other, except its expense, which is one of very minor importance, where the purity of so important a medicine as tartar emetic is concerned. The preference is given to it by Berzelius; and M. Henry, an eminent pharmaceutist of Paris, after an elaborate comparison of the different processes, declares in favour of this oxide, as superior to all others for preparing this antimonial salt. The weight of authority being thus in favour of the nitromuriatic oxide, the National Convention, in their last revision of the U. S. Pharmacopœia, acted judiciously in substituting the Dublin formula for tartar emetic, in place of Mr. Phillips's process originally adopted in that work.

The process of Mr. Phillips, here alluded to, consists in boiling one part of subsulphate of antimony with an equal weight of cream of tartar, and six parts of water. The boiling is continued, until the liquid becomes slightly turbid, when it is filtered, evaporated, and set aside to crystallize. The mother waters are twice successively boiled down, and two additional crops of crystals obtained, which, if not white, must be purified by solution and recrystallization. The subsulphate is formed by boiling powdered metallic antimony with twice its weight of sulphuric acid to dryness in an iron vessel, and washing the grayish product with water, until the uncombined sulphuric acid is separated. This substance, though called a subsulphate, is essentially the sesquioxide of antimony, the quantity of acid which it contains not constituting a definite proportion. Good tartar emetic may be obtained by this process, which, according to Mr. Phillips, is very productive. M. Henry, however, objects to it on account of the variable composition of the subsulphate employed.

The process of the Paris Codex coincides with that of the London College, in the employment of the glass; but it is very little followed, as the salt obtained by it requires repeated crystallizations to free it from the tartrates of lime and iron.

It has been already mentioned that M. Henry preferred the use of the nitromuriatic oxide for making tartar emetic; in other words, the Dublin process. He has thought, however, that it was susceptible of some improvements, and has given a process on a large scale, which he prefers. As this formula may be useful to the manufacturing chemist, we subjoin it, turning the French weights into the nearest apothecaries' weights and measures. Take of prepared sulphuret of antimony, in very fine powder, three pounds four ounces: muriatic acid, marking 22° (sp. gr. 1.178), eighteen pounds and a half; nitric acid two ounces and a half. Introduce the sulphuret into a glass matrass, of a capacity double the volume of the mixture to be formed, and add to it from three to five pounds of the acids previously mixed, so that the sulphuret may be thoroughly penetrated by them; then add the remainder of the acids. Place the matrass on a sand-bath, and heat the mixture gradually to ebullition; avoiding the vapours, which are disengaged in large quantity. Continue the heat, until the vapours given off are so far deprived of sulphuretted hydrogen, as not to blacken white paper, moistened with the solution of acetate of lead; after which allow the liquor to cool, and to remain at rest until it has become clear. Decant the clear liquid, and to obtain the portion of it which may be retained by the moist residue, mix this with a small portion of muriatic acid, and again decant. Mix the decanted liquids, which consist of a solution of muriate of antimony, and add them to a large quantity of water, in order that the nitromuriatic oxide may be precipitated; taking care, during their addition, to stir constantly in order that the precipitated powder may be more minutely divided, to facilitate its subsequent washing. To determine whether the water has been sufficient to decompose the whole of the muriate, a part of the supernatant liquid, after the subsidence of the powder, is to be added to a fresh portion of water; and if a precipitate takes place, more water must be added to the mixture, so as to obtain the largest possible quantity of the nitromuriatic oxide. The precipitation being completely effected, wash the powder repeatedly with water, until this no longer affects litmus, and then place it on linen to drain for twenty-four hours. The quantity of nitromuriatic oxide thus obtained will be about three pounds and a half in the moist state, or two pounds nine ounces when dry. Assuming it to be this quantity, mix it with three pounds eleven ounces of cream of tartar, in fine powder, and add the mixture to two gallons and five pints of boiling water, contained in an iron kettle. Concentrate the liquor rapidly until it marks 25° of Baumé's hydrometer for salts, and then filter. By repose, the liquor furnishes a crop of very pure crystals, which require only to be dried. The mother waters are treated in the following manner. Saturate the excess of acid with chalk, filter, and concentrate to 25°. By cooling, a second crop of crystals is obtained; and by proceeding in a similar manner, even a third crop. But the crystals thus obtained are somewhat coloured, and must be purified by recrystallization.

With regard to the above process, it may be observed, that the proportions of the cream of tartar and antimonial oxide must be adjusted according to the numbers given, on the assumption that the latter is dry; but it by no means follows that the whole of the oxide should be dried, which would cause a waste of time. The mode of proceeding is to weigh the whole of the moist oxide, and afterwards to weigh off a small part of it, and to ascertain how much this loses in drying. Then by a calculation it is easy to determine how much of the moist oxide must be taken, to be equivalent to a given quantity of the dry.

Properties. Tartrate of antimony and potassa is a colourless, inodorous salt, possessing a nauseous, styptic taste, and crystallizing usually in rhombic octohedrons. When prepared from the nitromuriatic oxide, it crystallizes in tetrahedrons, and the crystals are often an inch or more in diameter. As it occurs in the shops it is in the form of a white powder, formed by the pulverization of the crystals. The crystals, when exposed to the air, effloresce slightly and become opaque. They are insoluble in alcohol, but soluble in about fourteen times their weight of cold, and twice their weight of boiling water. Dr. Perceval of Dublin, however, asserts that good tartar emetic dissolves in twelve times its weight of cold water. Dr. Barker found that water saturated with this salt at the boiling temperature, would retain more of it when cooled than it is capable of taking up at common temperatures. Its aqueous solution reddens litmus, and undergoes spontaneous decomposition by keeping. Sulphuric, nitric, or muriatic acid, added to its solution, disturbs its transparency, and the alkalies and their carbonates precipitate the sesquioxide of antimony. It is decomposed also by some of the metals and their oxides, by lime-water, muriate of lime, acetate and subacetate of lead, and hydrosulphuric acid and its compounds. The decoctions and infusions of many plants, especially of those which are astringent and contain tannin, such as cinchona, rhubarb, galls, and catechu, precipitate it, with the effect of rendering it nearly or quite inert, and ought not to be associated with it in prescriptions. Other substances, such as tamarind-water, lemonade, whey, &c., decompose it, and give rise to new combinations, which, though not inert, are less active than the original salt.

When tartar emetic is pure, it should exhibit its appropriate crystalline form, and be entirely soluble in water. Its solution should not be precipitated by muriate of baryta, oxalate of ammonia, acidulous nitrate of silver, or acidulous acetate of lead. A precipitate by the first reagent indicates sulphuric acid; by the second, lime; by the third, muriatic acid; and by the fourth, cream of tartar. The most usual impurities which it contains, are uncombined cream of tartar arising either from the use of an excess of this salt in its preparation, or from its fraudulent admixture; tartrate of lime; silica and iron; and sulphate of lime. The tartrate of lime is derived from the cream of tartar, which always contains this impurity. It is liable to form on the surface of the crystals of tartar emetic in crystalline tufts, which are easily brushed off. Silica and iron are apt to be present when glass of antimony has been employed in preparing the antimonial salt, and the evaporation has been carried too far. Sulphate of lime is sometimes an impurity, when tartar emetic has been prepared by means of the subsulphate of antimony. According to Serullas, all the antimonial medicines, except well crystallized tartar emetic, are liable to contain a minute portion of arsenic. The crystalline form of this salt being one of the best tests of its purity, it ought always to be purchased by the apothecary in crystals. It is, indeed, sometimes sold in powder to conceal its imperfections.

Composition. Tartar emetic consists of two equiv. of tartaric acid 132.96, one of potassa 47.15, one of sesquioxide of antimony 153.2, and two of water 18=351.31. It is evident, therefore, that it contains tartaric acid and potassa in the precise proportions to form bitartrate of potassa or cream of tartar; and accordingly, it may be viewed as a compound of one equiv. of cream of tartar, and one of antimonial sesquioxide. The excess of acid in the bitartrate may be considered as saturated by the sesquioxide; and in that view it is a double salt, composed of the tartrate of potassa united with the tartrate of the sesquioxide of antimony. The name, therefore, of the U. S. and Dublin Pharmacopœias is the most correct.

Medical Properties and Uses. Tartrate of potassa and antimony is the most important of the antimonials, and is capable of fulfilling numerous indications in disease. Its general action is that of a sedative upon the circulation; while, on the contrary, it excites most of the secretions. According to the dose in which it is given, and the peculiar circumstances under which it is administered, it acts variously, as an alterative, diaphoretic, diuretic, expectorant, and emetic. In minute doses, it is employed either alone, or conjoined with calomel, with a view to its alterative effects, and has been found useful in diseases of the skin. In small doses, mostly associated with saline remedies, such as nitrate or sulphate of magnesia, and assisted by copious dilution, it is frequently resorted to in febrile complaints, for the purpose of producing perspiration, which is often copiously induced, especially if the remedy creates nausea. If the surface be exposed to cool air, so as to constrict the pores; the tendency will be to the kidneys, with the effect of producing an increased flow of urine. On the principle of exciting the secretions, it proves useful, on many occasions, in pulmonary and bronchial disease as an expectorant; and with a view to its action in this way, it is frequently conjoined with squill, ammoniac, and similar remedies. In full doses, it acts as an emetic, and as such is characterized by certainty, strength, and permanency of operation. It remains longer in the stomach than ipecacuanha, produces more frequent and longer continued efforts to vomit, and exerts a more powerful impression upon the system generally. The nausea and attendant prostration are often very great. As an emetic, its use is indicated where the object is not merely to evacuate the stomach, but to agitate and compress the liver and other abdominal viscera. By the extension of its action to the duodenum, it causes copious discharges of bile, and hence forms an appropriate remedy in those diseases, in which there is an accumulation of that secretion. It is emoloyed as an emetic in the commencement of fevers, especially those of an intermittent or bilious character, in jaundice, hooping cough, and spasmodic croup, and in several diseases of the nervous system, such as mania, amaurosis, tic douleureux, &c. In efforts to reduce old dislocations, its relaxing power is taken advantage of, in order to facilitate the operation. As an incidental effect to its diaphoretic and emetic operation, tartarized antimony often produces purging. Taking advantage of this tendency, practitioners are frequently in the habit of adding it to purgatives, the operation of which it promotes in a remarkable degree. It is contra-indicated in diseases of great debility, in the advanced stages of febrile affections, and in fevers attended with extreme irritability of stomach.

Of late years, on the continent of Europe, tartar emetic has been given in large doses in inflammatory diseases, with a view to its sedative, or, as it is usually termed, *contro-stimulant* operation. This practice originated with Rasori in Italy, and has been followed to a considerable extent in that country and in France. As yet it has had but few imitators in Great Britain or the United States. The chief diseases in which tartar emetic has been thus used are bronchitis, inflammation of the chest, acute rheumatism, chorea, hydrocephalus, and apoplexy. It is directed in doses varying from a grain to two grains and a half every two hours, dissolved in a small quantity of water; the patient being restricted in the use of drinks, whilst under its operation. It is stated, that when the medicine is thus given in diseases of high action, it very seldom produces vomiting, an effect which the authors of the practice wish to avoid. The use of tartar emetic in the doses mentioned is certainly hazardous, and we cannot, therefore, recommend an imitation of the practice. It cannot with propriety supersede the use of blood-letting, which is a safer and more efficient means of reducing inflammation. In cases, however, in which bleeding, both local and general, has been carried as far as the circumstances of the case will safely permit, and inflammatory action continues but partially subdued, the use of tartar emetic, in rather large doses, may sometimes prove useful.

Externally, tartar emetic is sometimes employed as a counter-irritant, mixed with lard or cerate, or sprinkled in very fine powder on adhesive plaster. (See *Unguentum Tartari Emetici*, Dub.) It causes, after a longer or shorter interval, a burning sensation, accompanied by a peculiar and painful pustular eruption. This mode of producing counter-irritation is exceedingly serviceable in a number of diseases; but particularly in deep seated pains, hooping cough, and chronic inflammation of the chest threatening consumption. Care must be taken, when the salt is applied by means of a plaster, that the pustular inflammation does not proceed too far; as in that event, it produces very painful deep seated ulcerations, difficult to heal. It acts by destroying the skin and subjacent cellular tissue in spots, without being absorbed.

Tartar emetic is almost always given in solution, and in an amount which varies with the intention in view in its administration. Its dose as an alterative, is from the sixteenth to the eighth of a grain; as a diaphoretic or expectorant, from an eighth to a sixth of a grain; and as a nauseating sudorific, from a quarter to half a grain; in each case, repeated once every one, two, or four hours. As an emetic, the full dose is from two to three grains, though it is usually given in divided portions of a grain dissolved in a tablespoonful of water, every ten or fifteen minutes until it vomits, the operation being aided by warm water, or warm chamomile tea. It is often conjoined with ipecacuanha, in the proportion of one or two grains to twenty of the vegetable emetic. For convenient administration in small doses, the Pharmacopœias order it dissolved in wine. (See *Vinum Antimonii.*)

Toxicological Properties. The effects produced by a poisonous dose o tartar emetic are an austere metallic taste; nausea; copious vomiting; frequent hickup; burning pain in the stomach; colic; frequent stools; fainting; small, contracted, and accelerated pulse; cold skin; sometimes intense heat; difficult respiration; loss of sense; convulsive movements; very painful cramps in the legs; prostration, and death. To these effects is sometime added difficulty of deglutition. Vomiting and purging do not always tak place; and when they are absent, the other symptoms are aggravated. If the patient has not vomited, immediate recourse must be had to tickling the throat with a feather, and the use of abundance of warm water. The administration of large quantities of oil will sometimes favour vomiting, and may prove useful. If vomiting be not quickly induced, it is necessary to give immediately a large amount of Peruvian bark, mixed with water or in decoction, with a view to decompose the poison. If the bark be not at hand, decoctions of common tea should be administered, until the former can be obtained. Alkaline sulphurets, according to Orfila, augment the irritation of the poison. Nevertheless, the late Dr. Duncan has recorded one case in which the sulphuret of potassa was completely successful. If the vomiting prove excessive, laudanum should be employed either by the mouth or by injection; and to combat the consecutive inflammation which is apt to be excited, bleeding, both local and general, and other antiphlogistic measures, should be resorted to.

Off. Prep. Mel Scillæ Compositum, *U.S.;* Vinum Antimonii, *U.S., Lond., Ed., Dub.;* Unguentum Tartari Emetici, *Dub.* B.

VINUM ANTIMONII. *U.S.* VINUM ANTIMONII TARTARIZATI. *Lond.;* VINUM TARTRATIS ANTIMONII. *Ed.* LIQUOR TARTARI EMETICI. *Dub.* *Antimonial Wine.*

"Take of Tartrate of Antimony and Potassa *a scruple;* Wine [Teneriffe] *ten fluidounces.* Dissolve the Tartrate of Antimony and Potassa in the Wine." *U.S.*

The *London* and *Dublin Colleges* direct one scruple of the salt to be dissolved in eight fluidounces of boiling distilled water, and two fluidounces of Rectified Spirit to be added to the solution. By the *Edinburgh* process, twenty-four grains are dissolved in a pound of Sherry wine.

In the revision of the United States Pharmacopœia, the proportion of tartar emetic was altered from four to two grains to the fluidounce of wine; so that our formula now corresponds with that of the British Colleges, and the highly important object has been accomplished, of uniformity in the strength of this very popular preparation. The slight difference between the troy ounce of the Edinburgh formula, and the fluidounce of the others, is scarcely deserving of notice in a practical point of view. The present officinal name was adopted as most convenient, sufficiently expressive, and in accordance with the nomenclature of several other metallic preparations, such as *Ceratum Arsenici, Emplastrum Ferri, Mistura Ferri Composita, &c.*

Difficulty is often experienced in effecting a solution of tartar emetic in wine; and precipitation is very apt to occur after the solution has been effected. These results are attributable either to impurity in the antimonial salt, which frequently contains supertartrate of potassa and various insoluble substances, or to inferiority in the character of the wine, which holds in solution vegetable principles that form insoluble compounds with the oxide of antimony. Dr. Paris states that he has seen the decomposition of the tartar emetic so complete, that no traces of the salt could be detected in the supernatant liquid. The difficulty is not avoided by the plan directed in the old Pharmacopœia, of first dissolving the antimonial in water, and then adding the wine; for even allowing that the solution may be accomplished, the same ingredients are present, and their mutual reaction must ultimately result in the same effects. The proper course is to select perfectly pure crystallized tartar emetic, and sound Teneriffe or Sherry wine, which make a permanent solution. To obviate the risk of decomposition and consequent inequality of strength, the London and Dublin Colleges direct water and rectified spirit in about the proportions in which these exist in the wines just mentioned. The only objection to this menstruum is the want of colour, which renders the preparation liable to be confounded with less active liquids.

The advantages of antimonial wine are, that it affords the means of administering minute doses of tartar emetic, and is more permanent than an aqueous solution of that salt, which is liable to spontaneous decomposition. It is usually administered in small doses as a diaphoretic or expectorant, or as an emetic in infantile cases. Where a considerable quantity of tartar emetic is requisite, it should always be given in extemporaneous aqueous solution. The dose of the wine as an expectorant or diaphoretic, is from ten to thirty drops, given frequently; as an emetic for children, from thirty drops to a fluidrachm, repeated every fifteen minutes till it operates. W.

ANTIMONII SULPHURETUM PRÆPARATUM. *U.S., Dub.*

Sulphuretum Antimonii Præparatum. *Ed. Prepared Sulphuret of Antimony.*

"Take of Sulphuret of Antimony *any quantity*. Prepare it in the manner directed for Carbonate of Lime." *U.S.*

"Powder Sulphuret of Antimony in an iron mortar, levigate it upon a porphyry stone with a little water, and put it into a large vessel. Then pour water on it, and, after frequently agitating the vessel, pour it off, loaded with the fine powder. Allow the water to remain at rest, and when the powder has subsided, dry it. The coarse powder, which the water could not suspend, is to be again levigated, and treated in the same way." *Ed.*

"Take of Sulphuret of Antimony *any quantity*. Reduce it to powder, and separate for use the impalpable particles, in the manner directed for the preparation of Chalk." *Dub.*

Sulphuret of antimony in mass is placed in the Materia Medica of all the Pharmacopœias noticed in this work. But for use in medicine, and for some pharmaceutical processes, it requires to be levigated, and hence the necessity of the above formulæ.

Properties. Prepared sulphuret of antimony is in the form of a dull insoluble powder, without taste or smell; usually of a blackish colour, but, when perfectly pure, reddish-brown. By exposure to air, it absorbs, according to Buchner, a portion of oxygen, and becomes partially converted into sesquioxide. Its usual adulterations and its composition are given under another head. (See *Antimonii Sulphuretum.*)

Medical Properties and Uses. This preparation is very uncertain in its operation; sometimes appearing to be almost inert, and at other times, if it meet with acid in the stomach, acting with extreme violence, producing vomiting and hypercatharsis. The effect usually attributed to it is that of a diaphoretic and alterative; and the diseases in which it is principally recommended, are scrofula, glandular obstructions, cutaneous diseases, and chronic rheumatism. It is very little employed by physicians in the United States, its use in this country being almost exclusively confined to veterinary practice. The dose is from ten to thirty grains, given in powder or bolus.

Off. Prep. Antimonii et Potassæ Tartras, *U.S.;* Antimonii Oxydum Nitromuriaticum, *Dub.;* Antimonii Sulphuretum Præcipitatum, *U. S., Ed., Dub.;* Pulvis Antimonialis, *Dub.* B.

ANTIMONII SULPHURETUM PRÆCIPITATUM. *U. S. Lond.*

Sulphuretum Antimonii Præcipitatum. *Ed.* Sulphur

ANTIMONIATUM FUSCUM. *Dub.* *Precipitated Sulphuret of Antimony.*

"Take of Prepared Sulphuret of Antimony *two pounds;* Solution of Potassa *four pints;* Distilled Water, Diluted Sulphuric Acid, each, *a sufficient quantity.* Mix the Sulphuret of Antimony with the Solution of Potassa, and three pints of Distilled Water, and boil them over a gentle fire for three hours, constantly stirring, and occasionally adding Distilled Water so as to preserve the same measure. Strain the liquor immediately through a double linen cloth, and gradually drop into it, while yet hot, sufficient Diluted Sulphuric Acid to precipitate the powder; then wash away the Sulphate of Potassa with hot water, dry the Precipitated Sulphuret of Antimony, and rub it into a fine powder." *U.S.*

The *London* process is the same as the above; the United States process having been adopted from that of the London College.

"Take of Water of Potassa *four parts;* Water *three parts;* Prepared Sulphuret of Antimony *two parts;* Diluted Sulphuric Acid *a sufficient quantity.* Mix the Sulphuret with the Water of Potassa and the Water; then boil them in a covered iron pot over a gentle fire for three hours, frequently stirring with an iron spatula, and adding water as it may be required. Strain the hot liquor through a double linen cloth, and add to it, when strained, as much of the Acid as may be necessary to precipitate the Sulphuret, which must be well washed with warm water." *Ed.*

"Take of Prepared Sulphuret of Antimony *one part;* Water of Caustic Potassa *eighteen parts;* Diluted Sulphuric Acid *eleven parts*, or *a sufficient quantity.* Add the Sulphuret of Antimony to the Water of Caustic Potassa, and boil for an hour. Strain the hot liquor through a double linen cloth, and drop into it the Diluted Sulphuric Acid. Wash away the Sulphate of Potassa with warm water. Dry the Brown Antimoniated Sulphur, and rub it into fine powder." *Dub.*

As the theory of the formation of the precipitated sulphuret of antimony is intimately connected with that for forming the substances called *kermes mineral*, and *golden sulphur*, we shall first describe the latter substances, as introductory to our account of the former.

Kermes mineral, according to Thenard, may be obtained by three distinct processes—by treating the sesquisulphuret of antimony with a boiling solution of the carbonated alkalies, with a boiling solution of the caustic alkalies, or with the carbonated alkalies at a red heat. These several processes give brown powders, which vary in their shade of colour, and which, though usually considered as identical, differ in composition. The kermes obtained by the first process is an oxysulphuret, that is, a mixture of sesquioxide of antimony with hydrated sesquisulphuret; while the product of the other two is essentially a hydrated sesquisulphuret, though containing occasionally a little oxysulphuret.

In France the process by the use of the carbonated alkalies in solution, is preferred for preparing the kermes; and the alkali selected is soda as giving a handsomer product. The formula of Cluzel is to boil for half an hour one part of pulverized sesquisulphuret of antimony with twenty-two or twenty-three parts of crystallized carbonate of soda, in two hundred and fifty parts of water, to filter the liquor and receive it in warm earthen pans, which must be covered, and allowed to cool slowly; at the end of twenty-four hours, the kermes is deposited. It is then collected on a filter, washed with *boiled* water, cooled without contact of air, dried at the temperature of 77°, and kept in bottles well stopped.

The rationale of the formation of kermes by this process is as follows:—a portion of the carbonate of soda is converted, by a transfer of carbonic acid, into caustic soda and sesquicarbonate. By a double decomposition taking place between a part of the sesquisulphuret of antimony and the caustic soda, sesquioxide of antimony, and sulphuret of sodium are formed. The sesquioxide then dissolves in the solution of carbonate of soda, and the undecomposed portion of the sesquisulphuret in that of the sulphuret of sodium. The sesquioxide and sesquisulphuret, being both more soluble in these menstrua hot than cold, precipitate together as the liquid cools, and constitute this variety of kermes. When thus obtained, the kermes is light, velvety, of a dark reddish-purple colour, brilliant in the sun, and of a crystalline appearance. It consists, according to M. Henri, jun., of sesquisulphuret of antimony 62.5, sesquioxide 27.4, water 10, soda a trace. In consequence of the presence of sesquioxide of antimony in this variety of kermes, it must be far more active than the other kinds which contain little or none of this oxide, and ought, therefore, to be preferred for medical use.

Kermes, when obtained by means of the caustic alkalies, may be formed by boiling for a quarter of an hour, two parts of the sesquisulphuret of antimony with one part of caustic potassa in twenty-five or thirty parts of water, filtering the liquor, and allowing it to cool, whereupon the kermes precipitates. In this process, one portion of the sesquisulphuret, by reacting with a portion of the potassa, gives rise to sesquioxide of antimony and sulphuret of potassium. A second portion dissolves in the sulphuret of potassium formed, and a third forms an insoluble compound with a part of the sesquioxide. The remainder of the sesquioxide unites with the potassa, forming a compound, which, being but sparingly soluble, is only in part dissolved. The filtered liquor, therefore, consists of a solution of this compound in water, and of sesquisulphuret of antimony in sulphuret of potassium. By refrigeration, the sesquisulphuret in a hydrated state falls down, free, or nearly free from sesquioxide, this latter being still held in solution by means of the caustic alkali with which it is united.

Kermes is obtained by the third method, or in the dry way, by rubbing together two parts of sesquisulphuret of antimony and one part of potassa of commerce, fusing the mixture in a crucible by a red heat, and treating the greenish-yellow mass formed with boiling water. On the cooling of the liquor, the kermes is deposited, the rationale of its formation being nearly the same with that for forming the second variety of kermes.

Kermes mineral is an insipid, inodorous powder, of different shades of brown. By the action of air and light it gradually becomes lighter coloured, until at last it attains a yellowish-white tint. It first came into use as a remedy in France about the beginning of the last century. Its mode of preparation was possessed as a secret by a French surgeon named La Ligerie, from whom, in 1720, the recipe was purchased by the French government, and made public.

Golden sulphur is formed by the addition of an acid to the liquor which remains after the precipitation of the kermes. According to the directions of the Paris Codex, acetic acid is employed for this purpose. The liquor, when potassa has been used, is at first a solution principally of sesquisulphuret of antimony in sulphuret of potassium. By the action of the air on the liquor, however, the sulphuret of potassium passes to a higher state of sulphuration; and consequently, the addition of an acid, while it throws down the sesquisulphuret of antimony, will precipitate at the same time the excess of sulphur in the sulphuret of potassium. Agreeably to this explanation, the golden sulphur may be considered as a mixture of hydrated sesquisulphuret of antimony with more or less sulphur. It is in the form of a powder of a golden yellow colour. It may be worth while to mention, that the kermes liquor after the use of the carbonated alkalies gives very little golden sulphur; while the liquors resulting from the two other processes yields it in abundance.

From the explanations above given, the reader is prepared to understand that the method of preparing the precipitated sulphuret of antimony of the United States and British Pharmacopœias, consists of the process for forming the kermes mineral by means of the *caustic alkalies*, combined with the process for golden sulphur; for while the refrigeration of the solution would of itself cause the precipitation of the second variety of kermes, or that which contains little or no antimonial oxide, the sulphuric acid added would throw down more or less of the golden sulphur. This view would make the officinal precipitated sulphuret, a mixture of sesquisulphuret and free sulphur, differing from the *true* golden sulphur, merely in containing less free sulphur. No further explanations are deemed necessary of the formulæ placed at the head of this article.

Properties of the Precipitated Sulphuret. This substance is an orange-coloured, insoluble powder, without smell, and possessing a slightly styptic taste. When heated it readily catches fire, burning with a greenish-blue flame, and giving off sulphurous acid, while the metal remains behind in the state of a grayish oxide. When pure it is not acted on by dilute sulphuric acid; and hence, if it effervesce with this acid, its adulteration with chalk may be suspected. It should readily dissolve in solutions of the caustic fixed alkalies.

Medical Properties. The precipitated sulphuret is diaphoretic or emetic according to the dose. It is, however, an uncertain medicine, as well from the want of uniformity in its composition, as from its liability to vary in its action with the state of the stomach. It is seldom given alone, but generally in combination with calomel and guaiac, in the form of Plummer's pill, as an alterative in secondary syphilis and cutaneous eruptions, or conjoined with henbane or hemlock, in chronic rheumatism. (See *Pilulæ Hydrargyri Submuriatis Compositæ*, Lond.) During its use the patient should abstain from acidulous drinks. Its dose as an alterative is from one to two grains twice a day in the form of pill; as an emetic, from five grains to a scruple. *Kermes* obtained by means of the carbonated alkalies, being a more active preparation, must be used in a smaller dose; while, on the other hand, the *true golden sulphur*, containing a greater excess of sulphur than the precipitated sulphuret, would perhaps require to be given in larger amount.

Off. Prep. Pil. Hydrargyri Submuriatis Comp. *Lond., Ed., Dub.* B.

PULVIS ANTIMONIALIS. *Lond., Dub.* OXIDUM ANTIMONII CUM PHOSPHATE CALCIS. *Ed.* *Antimonial Powder.*

"Take of Sulphuret of Antimony, in powder, *a pound;* Hartshorn shavings *two pounds.* Mix, and throw them into a wide crucible heated to whiteness, and stir them constantly until visible vapour ceases to arise. Rub the residue to powder, and put it into a proper crucible. Then apply heat, and raise it gradually to whiteness, and keep it so for two hours. Rub the residue into a very fine powder." *Lond.*

"Take of Sulphuret of Antimony, in coarse powder, Hartshorn shavings, each, *equal parts.* Mix, and put them into a shallow iron pot, heated to redness, and stir the mixture constantly, until it becomes of an ash-gray colour, and having removed it from the fire, reduce it to powder and put it into a coated crucible. Lute to this crucible another inverted over it, and perforated with a small hole in the bottom, and apply heat, which is to be gradually raised to whiteness, and then kept at that temperature for two hours. Lastly, reduce the matter, when cold, to a very fine powder." *Ed.*

The *Dublin* College uses the proportions of the London; but treats the materials in the manner directed in the Edinburgh formula.

This preparation, which consists of phosphate of lime, or bone-earth, mixed with antimony in an uncertain state of oxidation, is intended to furnish a substitute for the celebrated empyrical remedy of Dr. James, an English physician, after whom the original composition was called *James's powder*. Dr. Pearson, of London, found the genuine powder to consist, on analysis, of phosphate of lime and oxidized antimony; and, guided by his results, devised the formula adopted by the British Colleges for producing an imitation of it. By burning the materials directed in a wide vessel, while they are constantly stirred, the sulphur is expelled in the form of sulphurous acid, and the antimony is oxidized; while the hartshorn, which is of the nature of bone, has the greater part of its animal matter consumed. By the subsequent calcination at a white heat, the remainder of the animal matter is dissipated, leaving only the phosphate of lime mixed with the oxidized antimony. This mixture constitutes the antimonial powder. The only material difference between the processes of the Colleges, is that the London and Dublin use two parts of hartshorn shavings to one of sulphuret; while the Edinburgh College employs equal parts which are also the proportions adopted in the Paris Codex. The use of the larger proportion of hartshorn is stated to obviate the inconvenience of the vitrification of part of the antimony; but Dr. Duncan alleges that the product thus obtained does not correspond so nearly with James's powder, as analyzed by Dr. Pearson, as when the smaller proportion is employed.

In consequence of the variable nature of antimonial powder, as obtained in the processes of the Colleges by the agency of fire, Mr. Chenevix proposed to form it in the humid way, by dissolving equal weights of nitromuriatic oxide of antimony and precipitated phosphate of lime, in the smallest possible quantity of muriatic acid, and precipitating this solution by adding it to diluted water of ammonia. The solvent power of the muriatic acid being destroyed by the ammonia, the precipitate will be an intimate mixture, in determinate proportions, of sesquioxide of antimony and phosphate of lime. This precipitate, Mr. Chenevix states, is soluble in any acid capable of dissolving its constituents separately. On the other hand, 28 per cent. of James's powder, and about 44 per cent. of the London antimonial powder resist the action of all acids. It is hence evident that Mr. Chenevix's powder would prove far more active than those for which it is proposed as a substitute. This objection to it might be obviated by increasing the proportion of phosphate of lime; but still it is liable to the inconvenience, according to Mr. Brande, of becoming horny or gritty, and difficult to powder.

Properties, &c. Antimonial powder has a dull-white colour, is tasteless and inodorous, and insoluble in water. It is only partially soluble in acids; the phosphate of lime, and any sesquioxide of antimony present being dissolved, and a variable amount of antimonious acid (deutoxide of antimony) remaining behind. Its activity as a medicine will depend upon the proportion of sesquioxide present, the quantity of which may be judged of by dropping the muriatic solution obtained from the preparation into water, whereby the sesquioxide will be precipitated. Its composition varies exceedingly, a circumstance which is a strong objection to it as a medicine. Mr. Phillips analyzed two specimens, and found one to contain 35, the other 38 per cent. of oxidized antimony, the remainder being phosphate of lime. Mr. Brande has generally obtained a greater discordance of results, and occasionally detected as much as 5 per cent. of sesquioxide. From the James's powder, both Dr. Pearson and Mr. Phillips obtained from 56 to 57 per cent. of oxidized antimony. A portion of this powder, derived from the heirs of Dr. James, was found by Berzelius to contain nearly two-thirds antimonious acid, one-third phosphate of lime, and scarcely one per cent. of antimonite of lime soluble in water. Phillips and Brande speak of the antimony as being in the state of *peroxide* (antimonic acid); but it can be shown that it must be in the state of *deutoxide*, or antimonious acid, as stated by Berzelius, if the preparation be made according to the directions of the Colleges. This is evident from the circumstance, that the high heat to which the preparation is exposed would decompose the peroxide, and is compatible only with the existence of the deutoxide. When antimonial powder, therefore, contains sesquioxide, in which case only it is active, its presence must arise from the materials having been exposed to a lower heat than that directed by the Colleges.

Medical Properties and Uses. This preparation is stated to be alterative, diaphoretic, purgative, or emetic, according to the dose in which it may be given. Until within a few years it was very much used in febrile diseases, with a view to its diaphoretic effect. According to Dr. A. T. Thomson, it is advantageously given in acute rheumatism, conjoined with camphor, calomel, and opium, and with calomel and guaiac in several cutaneous affections. The estimation in which this preparation is held is very various. The late Dr. Duncan characterizes it as one of the best antimonials we possess; yet he acknowledges that its effects vary very much, either from idiosyncrasy, or variations in its composition. Dr. Thomson found it sometimes to answer his expectations, but as often to disappoint them. Mr. Brande admits its activity sometimes, and entire inertness at others, differences which he attributes to the presence or absence of *sesquioxide* of antimony. Upon the whole, it appears evident, that, whatever may be the occasional efficacy of this medicine, it is too variable in its composition, from circumstances in its preparation scarcely within the control of the pharmaceutical chemist, to make it a safe remedy. No therapeutical effect can be expected from it, which cannot be more certainly and safely produced by tartar emetic; and it seems to be the sentiment of some of the best practitioners, that this antimonial may in all cases be advantageously substituted for it. Considerations of this kind, no doubt, influenced the United States Medical Convention, in omitting it from our Pharmacopœia of 1830.

The dose of antimonial powder as a diaphoretic, is from three to eight grains every third or fourth hour, given in the form of pill. In larger doses it is purgative or emetic. It is impossible, however, to give precise directions as to the dose; as it sometimes proves virulently emetic, and at other times is without any obvious effect, even in doses of 100 grains. B.

AQUA.

Water.

AQUA DESTILLATA. *U.S., Lond., Ed.* AQUA DISTILLATA. *Dub.* *Distilled Water.*

"Take of Water *ten gallons.* First distil four pints, and throw them away; then distil four gallons. Keep the Distilled Water in a glass bottle." *U.S., Lond.*

"Let Water be distilled in appropriate and very clean vessels, until about two-thirds have come over." *Ed.*

"Take of Water *twenty pounds.* Put it into a glass retort, and having rejected the first pound which comes over, distil a gallon with a moderate heat." *Dub.*

The purest natural water is not sufficiently pure for some pharmaceutical purposes; and hence the necessity of the above processes for its distillation. It is best to reject the first portion which comes over, as this may contain carbonic acid and other volatile impurities, and the last portions of the water ought not to be distilled, lest it should pass over in an empyreumatic state. The Dublin College directs the distillation to be conducted in a glass retort; but it is usually performed with the ordinary still and condenser, and such an apparatus is evidently contemplated in the United States and London formula. Mr. Brande states that distilled water often derives from the still a foreign flavour, which it is difficult to avoid. He therefore recommends that a still and condenser be exclusively kept for distilling water; or, where this cannot be done, that steam be driven through the condensing pipe for half an hour, for the purpose of washing it out before it is used; the worm-tub having been previously emptied.

Properties, &c. Distilled water, as usually obtained, has always a vapid and disagreeable taste. It is not perfectly pure; water, to be so, requiring to be distilled in silver vessels. The properties of pure water have already been given under the head of *Aqua.* Distilled water should undergo no change on the addition of tincture of soap, subacetate of lead, nitrate of baryta, oxalate of ammonia, nitrate of silver, or lime-water. It is uselessly employed in some formulæ; but is essentially necessary in others. As a general rule, when small quantities of active remedies are to be given in solution, and in the preparation of collyria, distilled water should be employed. The following list contains the chief substances which require distilled water as a solvent;—tartar emetic, corrosive sublimate, nitrate of silver, muriate of baryta, acetate of lead, the sulphates of iron and zinc, sulphate of quinia, and sulphate and acetate of morphia. B.

◆

AQUÆ MEDICATÆ. *U.S.*

Medicated Waters.

Under this head are included, in the United States Pharmacopœia, all those preparations consisting of water impregnated with some medicinal substance, which are not arranged in any other class. Among them are the Distilled Waters of the British Pharmacopœias, which therefore require some notice in the present place.

Aquæ Destillatæ. *Lond.* Aquæ Stillatitiæ. *Ed.* Aquæ Distillatæ. *Dub.* Many vegetables impart to water distilled from them their peculiar flavour, and more or less of the medical properties by which they are distinguished. The distilled waters chiefly used, are those prepared from aromatic plants, the volatile oil of which rises with the aqueous vapour, and is condensed with it in the receiver. But as water is capable of holding but a small proportion of the oil in solution, these preparations are generally feeble, and are employed rather as pleasant vehicles or corrigents of other medicines, than with a view to any remediate action of their own.

In the preparation of the distilled waters, the London College directs the dried plants, because the fresh are not to be had at all seasons; but the latter, at least in the instances of herbs and flowers, should be preferred if attainable. Flowers which lose their odour by desiccation, may be preserved by incorporating them intimately with one-third of their weight of common salt; and in this state, according to M. Decroizilles, afford distilled waters of very delicate flavour.

It is necessary to observe certain practical rules in conducting the process of distillation. When the substance employed is dry, hard, and fibrous, it should be mechanically divided, and macerated in water for a short time previously to the operation. The quantity of materials should not bear too large a proportion to the capacity of the alembic, as the water might otherwise boil over into the receiver. The water should be brought quickly to the state of ebullition, and continued in that state till the end of the process. Care should be taken to leave sufficient water undistilled to cover the whole of the vegetable matter, lest a portion of the latter, coming in contact with the sides of the vessel, might be decomposed by the heat, and yield empyreumatic products. If any volatile oil float upon the surface of the distilled water, it should be separated.

But however carefully the process may be conducted, the distilled waters prepared from plants always have at first an unpleasant smoky odour. To free them from this, it is necessary to expose them for a short time to the air, before enclosing them in well stopped bottles, in which they should be ultimately preserved. When long kept they are apt to form a viscid ropy matter, and to become sour. This result is ascribable to other principles, which rise with the oil in distillation, and promote its decomposition. To prevent this decomposition, the *London College* orders the addition of five fluidounces of proof spirit to a gallon of the distilled water; the *Edinburgh*, five ounces of diluted alcohol to ten pounds; and the *Dublin*, half an ounce of rectified spirit to a pound. But this addition is inadequate to the intended object. A better plan is to redistil the waters; as, when thus purified, it is said that they may be kept for several years unchanged.

Another mode of preparing the distilled waters, is to substitute the volatile oil, previously separated from the plant, for the plant itself in the process. This mode is directed by the London and Dublin Colleges in several instances. It is preferable to the preceding, as it affords a purer and more permanent product.

In relation to most of the aromatics, the United States Pharmacopœia discards altogether the process by distillation, and directs that water should be impregnated with the volatile oil by trituration with magnesia, and subsequent filtration. This is by far the most simple and easy process; and the resulting preparation is in all respects equal to that obtained by distillation from the oil. The aromatic solution is pure and permanent, and, notwithstanding the assertion of Dr. Paris to the contrary, is perfectly transparent, the magnesia being separated by the filtration. The carbonate of magnesia, however, should be employed in preference to the pure earth; as the latter sometimes gives a brownish colour to the liquid, and requires to be used in larger proportion. A minute quantity, moreover, of the magnesia is dissolved, and attracting carbonic acid from the air, becomes a carbonate, and is precipitated in a flocculent form. The object of the magnesia or its carbonate is simply to enable the oil to be brought to a state of minute division, and thus presented with a larger surface to the action of the solvent. Chalk and sugar answer a similar purpose; but the latter, by being dissolved with the oil, renders the preparation impure. W.

AQUA ACIDI CARBONICI. *U.S.* *Carbonic Acid Water. Artificial Seltzer Water.*

"By means of a forcing pump, throw into a suitable receiver, nearly filled with Water, a quantity of Carbonic Acid equal to five times the bulk of the Water.

"Carbonic Acid is obtained from the Hard Carbonate of Lime, by means of dilute Sulphuric Acid." *U.S.*

This preparation, which is not adopted by the British Colleges, consists of water highly charged with carbonic acid. Water is found to take up its volume of this acid under the pressure of the atmosphere; and Dr. Henry ascertained, from numerous experiments, that precisely the same *volume* of the *compressed* gas is absorbed under a higher pressure. From this law, the bulk taken up is constant, the quantity being different in proportion as there is more or less driven into a given space. As the space occupied by a gas is inversely as the compressing force, it follows that the quantity of the acid forced into the water will be directly as the pressure. A double pressure will force a double quantity into a given space, and, therefore, cause a double quantity to be absorbed; a treble pressure will drive a treble quantity into the same space, and cause its absorption; and so on for higher pressures, the *bulk* of the *compressed* gas absorbed always remaining the same. From the principles above laid down, it follows, that to saturate water with five times its volume of carbonic acid, as directed in the formula, it must be subjected to a pressure of five atmospheres. This is about the strength of the carbonic acid water manufactured in the United States.

Carbonic acid water is familiarly called in this country "mineral water," and "soda water;" the latter name, originally applied to the preparation when it contained a small portion of carbonate of soda, being from habit continued since the alkali has been omitted. As it is largely consumed, both as an agreeable beverage and as a medicine, it will be proper to give a sketch of the apparatus usually employed in its preparation. This consists of a generator, gasometer, forcing pump, reservoir or fountain, and refrigerator. The generator is usually formed of a wooden tub somewhat like a churn, into which the dilute sulphuric acid is put. On this is luted a small cylindrical wooden vessel, through the bottom of which passes a wooden stirrer. This vessel is filled with marble powder, which, by the movement of the stirrer, is made gradually to fall into the acid below, generating the carbonic acid, which by a lead pipe is conducted into the gasometer. This is a large cylindrical tub, in which another is inverted suspended by a pulley. As soon as the gasometer is full, which should have five or six times the capacity of the reservoir, the operation of condensing the gas into the latter is commenced. This is effected by a condensing pump, the chamber of which is made to communicate, by leaden tubes on opposite sides, with the gasometer and reservoir. The latter, usually called the fountain, is a very strong cylindrica copper vessel, with hemispherical extremities, tinned on the inside, and, before receiving the carbonic acid, nearly filled with water. When the water has been duly charged with the acid gas, it is drawn off as it is wanted, by means of a stop-cock connected with a tube which passes to the bottom of the reservoir. The tube may be of any desired length, so as to draw off the water at a distance from the reservoir. The apparatus is usually placed in the cellar, and the tube from the reservoir is made to pass through the floor and counter of the shop, and terminate in a stop-cock, by means of which the carbonic acid water may be drawn off at pleasure. In order to have the liquid cool in summer, the tube from the cellar generally terminates in a strong metallic vessel of convenient shape, placed under the counter and surrounded with ice, and from this vessel the tube penetrating the counter proceeds.

The acid gas for the impregnation of the water is always obtained from marble dust by the action of sulphuric acid; these being the cheapest materials for the purpose. Chalk may also be used, but is objectionable on account of its communicatiug an unpleasant smell to the carbonic acid. When sulphuric acid is employed, sulphate of lime is formed, which interferes with the action of the acid; and hence it is necessary to stir the mixture to render the decomposition of the carbonate complete.

Properties. Carbonic acid water is a sparkling liquid, possessing an agreeable, pungent, acidulous taste. It reddens litmus feebly, and is precipitated by lime-water. Being impregnated with the acid gas under the influence of pressure, it effervesces strongly when freed from restraint. Hence, to preserve its briskness, it should be kept in strong well corked bottles, placed inverted in a cool place. Several natural waters are of a similar nature; such as those of Seltzer, Spa, and Pyrmont; but the artificial preparation has the advantage of a stronger impregnation with the acid gas. Carbonic acid water should be made with every precaution to avoid metallic impurity. Hence the necessity of having the reservoir or fountain well tinned on the inner surface. Even with this precaution, a slight metallic impregnation is not always avoided, especially in the winter season, when the water is less consumed as a drink, and, therefore, allowed to remain longer in the reservoir. Glass fountains are sometimes used with advantage in this season; and a patent has been taken out for a stoneware fountain enclosed in tinned copper, which has been found to answer a good purpose. When leaden tubes are employed to convey the water, it is liable to be contaminated with this metal, which renders it deleterious. A case of colica pictonum came under the care of one of our medical friends, arising from the daily use of the first draught of carbonic acid water from a fountain furnished with tubes of lead. Tin tubes are sometimes employed, enclosed in lead ones to give them strength.

Carbonic acid, formerly called *fixed air*, is a colourless gas, of a slightly pungent odour and acid taste. It reddens litmus feebly, and combines with salifiable bases, forming salts called carbonates, from which it is expelled by all the strong acids. It extinguishes flame, and is quickly fatal to animals when respired. All kinds of fermented liquors, which are brisk or sparkling, such as champagne, cider, porter, &c., owe these properties to its presence. Its sp. gr. is 1.52. It is composed of one equiv. of carbon 6.12, and two of oxygen 16=22.12.

Medical Properties and Uses. Carbonic acid water is diaphoretic, diuretic, and anti-emetic. It forms a very grateful drink to febrile patients, allaying thirst, lessening nausea and gastric distress, and promoting the secretion of urine. The quantity taken need only be regulated by the reasonable wishes of the patient. It also forms a very convenient vehicle for the administration of magnesia, the carbonated alkalies, sulphate of magnesia, and the saline cathartics generally; rendering these medicines less unpleasant to the palate, and, in irritable states of the stomach, increasing the chances of their being retained. When used for this purpose, six or eight fluidounces will be sufficient. B.

AQUA ANETHI. *Lond.* *Dill Water.*

"Take of Dill Seeds, bruised, *a pound.* Pour on them so much water, that, after the distillation, sufficient may remain to prevent empyreuma. Distil *a gallon.*" *Lond.*

This is seldom if ever used in the United States. W.

AQUA AURANTII CORTICIS. *U.S.* AQUA CITRI AURANTII. *Ed.* *Water of Orange Peel.*

"Take of Fresh Orange Peel *two pounds;* Water *a sufficient quantity;* Diluted Alcohol *four fluidounces.* Pour upon the Orange Peel so much Water, that, after the distillation, sufficient may remain to prevent empyreuma. Then distil a gallon, and add the Diluted Alcohol." *U.S.*

The *Edinburgh College* directs ten pounds of the Water to be distilled from two pounds of the Peel. W.

AQUA CAMPHORÆ. *U.S.* MISTURA CAMPHORÆ. *Lond., Dub.* EMULSIO CAMPHORÆ. *Ed.* *Camphor Water.*

"Take of Camphor *two drachms;* Alcohol *forty minims;* Magnesia *a drachm;* Distilled Water *two pints.* Rub the Camphor first with the Alcohol, afterwards with the Magnesia, and lastly with the Water gradually added; then filter through paper." *U.S.*

The *London College* directs half a drachm of camphor, ten minims of alcohol, and a pint of water, without magnesia. The *Dublin College* orders a scruple of camphor, ten drops of alcohol, a pint of warm water, and instead of the magnesia, half an ounce of sugar. The process in each case is completed as in the United States Pharmacopœia. The *Edinburgh College* directs a scruple of camphor and half an ounce of sugar, well rubbed together, to be beat with half an ounce of blanched sweet almonds, a pound and a half of water to be gradually added, and the mixture to be strained.

In all these processes the object is to effect a solution of the camphor. Water is capable of dissolving but a small proportion of this principle; but the quantity varies with the method employed. Prepared according to the London process, one pint of the water contains only thirteen grains of camphor; according to those of Edinburgh and Dublin less than twenty grains; while our own officinal preparation contains about fifty grains to the pint, or more than three grains to the fluidounce. (*Journ. of the Phil. Col. of Pharm.* iv. 13.) The difference is attributable to the minute division effected in the camphor by trituration with the magnesia, which is afterwards separated by filtration. The use of the alcohol is simply to break down the cohesion of the camphor, and enable it to be more easily pulverized. The process of the United States Pharmacopœia is much preferable to the others, as it affords a permanent solution of sufficient strength to be employed with a view to the influence of the camphor on the system, while the British preparations have little more than the flavour of the narcotic, and are fit only for vehicles of other medicines. The camphor is separated by a solution of pure potassa, and according to Dr. Paris, by sulphate of magnesia and several other salts.

Camphor water is chiefly employed in low fevers and typhoid diseases attended with restlessness, slight delirium, or other symptoms of nervous derangement or debility. It has this advantage over camphor in substance, that the latter is with difficulty dissolved by the liquors of the stomach; but it is not applicable to cases where very large doses of the medicine are required. It is usually given in the dose of one or two tablespoonfuls repeated every hour or two hours. W.

AQUA CARUI. *Lond., Dub.* *Caraway Water.*

"Take of Caraway Seeds, bruised, *a pound.* Pour on them so much Water, that, after the distillation, sufficient may remain to prevent empyreuma. Distil *a gallon.*" *Lond.*

The proportions of the *Dublin College* are the same.

Caraway water has the flavour and pungency of the seeds, but is not used in this country. W.

AQUA CHLORINII. *Dub.* *Chlorine Water.*

"Take of dried Muriate of Soda *one hundred parts;* Oxide of Manganese *thirty parts;* Sulphuric Acid *eighty-seven parts;* Water *one hundred and twenty-four parts.* Add the Acid gradually to the Water, and when the mixture has grown cold, pour it on the Muriate of Soda and Oxide of Manganese, reduced to fine powder, well mixed, and put into a retort. Then with a proper apparatus and a moderate heat gradually increased, transmit the gas escaping from the mixture through two hundred parts of Distilled Water; the operation being concluded as soon as the effervescence in the retort has ceased. Chlorine Water should be kept in well stopped glass bottles, and in a place impervious to the rays of light." *Dub.*

This formula is intended to furnish a saturated solution of chlorine in water. The materials employed are those usually taken for generating chlorine; and this, as it is extricated in a gaseous state, is passed into a portion of water, with a view to its being absorbed. The muriate of soda of the formula is the chloride of sodium of modern chemists. This, when acted on by dilute sulphuric acid and peroxide of manganese, is decomposed, the chlorine is extricated, and the sodium and peroxide of manganese, having been converted, by a transfer of oxygen from the latter to the former, into soda and protoxide, unite with the sulphuric acid, and form sulphate of soda and protosulphate of manganese, which remain behind. The water intended to receive the gas is most conveniently placed in a series of Wolfe's bottles, the last of which should contain some slaked lime, to absorb any excess of chlorine, which might otherwise produce inconvenience by its escape.

Properties. Chlorine water has a yellowish-green colour, a harsh styptic taste, and the peculiar odour of the gas which it contains. Like gaseous chlorine, it destroys all vegetable colours. When cooled to about the freezing point, it forms deep-yellow crystalline plates, consisting of hydrate of chlorine. At the temperature of 50° it contains about twice its volume of the gas. It is decomposed by light, with the production of muriatic acid, and the evolution of oxygen. It is on this account that it requires to be kept in a dark place.

Chlorine is an elementary gaseous fluid, of a greenish-yellow colour, and characteristic and disagreeable smell and taste. Its sp. gr. is 2.47, and its equivalent number 35.42. It is a supporter of combustion, but destructive of life in respiration. When the attempt is made to breathe it, even much diluted, it excites cough and a sense of suffocation, and causes a discharge from the nostrils resembling coryza. When breathed in considerable quantities, it produces spitting of blood, violent pains, and death. It is the agent almost exclusively employed in bleaching and in disinfecting operations.

Medical Properties and Uses. Chlorine water is stimulant and antiseptic.

It is highly esteemed by some practitioners, but as yet is very little employed. It has been used in typhus, and chronic affections of the liver, but the diseases in which it has been most extolled are scarlatina and malignant sore-throat. Externally, it may be used, duly diluted, as a gargle in putrid sore-throat, as a wash for ill-conditioned ulcers and cancerous sores, and as a local bath in diseases of the liver; though for the latter purpose, the nitro-muriatic acid, which is in effect a solution of chlorine, is usually employed. As it depends upon chlorine for its activity, its medical properties coincide generally with those of *chloride of lime*, *chloride of soda*, and *nitromuriatic acid*, to which articles the reader is referred. The dose of chlorine water is from one to two fluidrachms, diluted with eight fluidounces of water, and given in the course of the day. B.

AQUA CINNAMOMI. *U.S., Lond., Dub.* AQUA LAURI CINNAMOMI. *Ed.* *Cinnamon Water.*

"Take of Oil of Cinnamon *half a fluidrachm;* Magnesia *half a drachm;* Distilled Water *two pints.* Rub the Oil of Cinnamon first with the Magnesia, then with the Water gradually added, and filter through paper." *U.S.*

"Take of Cinnamon Bark, bruised, *a pound;* or Oil of Cinnamon, by weight, *five scruples.* Pour so much water on the oil, or on the bark, previously macerated in water for twenty-four hours, that, after the distillation, sufficient may remain to prevent empyreuma. Distil *a gallon.*" *Lond.*

The process of the *Dublin College* is the same with the preceding, except that three drachms of the oil are directed instead of five scruples. The *Edinburgh College* orders ten pounds of water to be distilled from a pound of the bark.

Of these processes, that of the United States Pharmacopœia is decidedly preferable, as much easier than the others, and affording a product in every respect equal, if not superior. Carbonate of magnesia, however, should be used instead of the pure earth, as the latter, in the quantity indicated, forms a semifluid mass with the oil, which is with some difficulty miscible with the water; and, though this disadvantage might be obviated by increasing the quantity of the magnesia, still the objection remains that the preparation is apt to have a brownish colour, which is not produced by the carbonate. Besides, a minute proportion of magnesia is dissolved, sufficient to render the preparation incompatible with small quantities of the sulphates of morphia and quinia, for which it is sometimes employed as a menstruum.

Cinnamon water is a favourite vehicle with many practitioners for other less pleasant medicines; but should be used cautiously in inflammatory affections. For ordinary purposes it is sufficiently strong when diluted with an equal measure of water.

Off. Prep. Mistura Calcis Carbonatis, *U.S.;* Mistura Guaiaci, *Lond.* W.

AQUA LAURI CASSIÆ. *Ed.* *Water of Cassia.*

This is prepared from the variety of cinnamon called cassia, in the manner directed by the Edinburgh College for cinnamon water. The distinction is not recognised in our Pharmacopœia. W.

AQUA CITRI MEDICÆ. *Ed.* *Water of Lemon Peel.*

The *Edinburgh College* directs ten pounds of water to be distilled from two pounds of the fresh peel duly macerated; sufficient water being left to prevent empyreuma. The preparation is almost unknown in this country. W.

AQUA FŒNICULI. *Lond., Dub.* *Fennel Water.*

"Take of Fennel seeds, bruised, *a pound.* Pour on them so much water that, after the distillation, sufficient may remain to prevent empyreuma. Distil *a gallon.*" *Lond.*

The proportions of the *Dublin College* are the same.

Fennel water is seldom used, as the infusion answers a better purpose.
W.

AQUA LAURO-CERASI. *Dub.* *Water of Cherry Laurel.*

"Take of Fresh Leaves of Cherry Laurel *a pound;* Water *three pints.* Distil *a pint*, and instead of Rectified Spirit, add of Compound Spirit of Lavender *an ounce.*" *Dub.*

The substitution of the compound spirit of lavender for alcohol, is in order to impart colour to the preparation, and thus prevent it from being mistaken for common water. It is employed in Europe as a sedative narcotic, identical in its properties with a dilute solution of hydrocyanic acid. The dose is from thirty minims to a fluidrachm.
W.

AQUA MENTHÆ PIPERITÆ. *U.S., Lond., Ed., Dub.* *Peppermint Water.*

This is prepared, according to the United States Pharmacopœia, from the oil of peppermint, in the manner directed for cinnamon water; but the caution should in this instance also be observed, of substituting the carbonate of magnesia for pure magnesia.

"Take of Peppermint, dried, *a pound and a half*, or Oil of Peppermint, by weight, *three drachms.* Pour on the herb or the oil so much water, that, after the distillation, sufficient may remain to prevent empyreuma. Distil *a gallon.*" When the fresh herb is used the quantity should be doubled. *Lond.*

The *Edinburgh College* distils ten pounds of the water from three pounds of peppermint. The *Dublin* process is essentially the same with the London.
W.

AQUA MENTHÆ VIRIDIS. *U.S., Lond., Ed., Dub.* *Spearmint Water.*

This is prepared, according to the United States Pharmacopœia, from the oil of spearmint, in the manner directed for cinnamon and peppermint waters.

By the British Colleges it is also prepared in the manner directed by them for peppermint water.

The two mint waters are among the most grateful and most employed of this class of preparations. Together with cinnamon water, they are used in this country, almost to the exclusion of all others, as the vehicle of medicines given in the form of mixture. They serve not only to conceal or qualify the taste of other medicines, but also to counteract their nauseating properties. The peppermint water is generally thought to have a more pleasant flavour than that of spearmint, but some prefer the latter. Their effects are the same.
W.

AQUA PICIS LIQUIDÆ. *Dub.* *Tar Water.*

"Take of Tar *two pints;* Water *a gallon.* Mix, stirring with a wooden rod for fifteen minutes; then, after the Tar shall have subsided, strain the liquor, and keep it in well stopped bottles." *Dub.*

Water takes from tar a small portion of acetic acid, empyreumatic oil, and resinous matter, acquiring a sharp empyreumatic taste, and the colour of Madeira wine. Thus impregnated it is stimulant and diuretic; and, though at present little used, was formerly highly extolled as a remedy in pulmonary consumption. It may be given with occasional advantage in chronic catarrhal affections, and complaints of the urinary passages. From one to two pints may be taken in the course of the day. W.

AQUA PIMENTÆ. *Lond., Dub.* AQUA MYRTI PIMENTÆ. *Ed.* *Pimento Water.*

"Take of Pimento, bruised, *half a pound;* Water *a pint.* Macerate the berries in the Water for twenty-four hours; then add so much Water, that, after the distillation, sufficient may remain to prevent empyreuma. Distil *a gallon.*" *Lond.*

The *Edinburgh College* distils ten pounds. The *Dublin* process is essentially the same with the London.

Pimento water is brownish when first distilled, and upon standing deposites a brown resinous sediment. It is used as a carminative. W.

AQUA PULEGII. *Lond., Dub.* AQUA MENTHÆ PULEGII. *Ed.* *Pennyroyal Water.*

This is prepared from the European pennyroyal or its oil, precisely in the manner directed by the British Colleges for peppermint water. It is not used in this country, as we have not the plant. A water prepared from the *Hedeoma pulegioides*, or American pennyroyal, might be substituted.

Pennyroyal water is employed for the same purposes as those of peppermint and spearmint.

Off. Prep. Mistura Ammoniaci, *Dub.;* Mistura Assæfœtida, *Dub.* W.

AQUA ROSÆ. *U.S., Lond., Dub.* AQUA ROSÆ CENTIFOLIÆ. *Ed.* *Rose Water.*

"Take of Fresh Hundred-leaved Roses *six pounds;* Water *a sufficient quantity;* Diluted Alcohol *four fluidounces.* Pour on the Roses so much Water, that, after the distillation, sufficient may remain to prevent empyreuma. Then distil *a gallon*, and add the Diluted Alcohol." *U.S.*

The *London* and *Dublin Colleges* order a gallon of the Water to be distilled from eight pounds of the petals; the *Edinburgh*, ten pounds of the Water from six pounds of the petals.

It should be observed, that in the nomenclature of the United States Pharmacopœia, the term "Roses" implies only the petals of the flower. These are directed in the recent state; but it is said that when preserved by being incorporated with one-third of their weight of common salt, they retain their odour, and afford a Water equally fragrant with that prepared from the fresh flower.

Rose water, when properly prepared, has the delightful perfume of the rose in great perfection. It is most successfully made on a large scale. Like the other distilled waters it is liable to spoil when kept; and the alcohol which is added to preserve it is incompatible with some of the purposes to which the water is applied. It is best, therefore, to avoid this addition, and to substitute a second distillation. This distilled water is chiefly employed on account of its pleasant odour in collyria and other lotions. It is wholly destitute of irritating properties, unless when it contains alcohol.

Off. Prep. Mistura Ferri Composita, *U.S., Lond., Dub.;* Mistura Moschi, *Lond.;* Unguentum Aquæ Rosæ, *U.S.* W.

ARGENTUM.

Preparations of Silver.

ARGENTI NITRAS. *U.S., Lond.* NITRAS ARGENTI. *Ed.* ARGENTI NITRAS FUSUM. *Dub.* *Nitrate of Silver.* *Lunar Caustic.*

"Take of Silver, flattened into plates and cut, *an ounce;* Nitric Acid *five fluidrachms* [a fluidounce, *Lond.*]; Distilled Water *two fluidounces.* Mix the Acid with the Water, and dissolve the Silver in the mixture, on a sand-bath. Then gradually increase the heat, so that the Nitrate of Silver may be dried. Melt this in a crucible over a gentle fire, and continue the heat till ebullition ceases; then immediately pour it into suitable moulds. Lastly, wrap it in white paper, and keep it in a well stopped bottle." *U.S.*

The *London* formula differs from the preceding only in the proportion of nitric acid employed, as above indicated, and in omitting to give any directions for wrapping the salt in white paper, and for preserving it in bottles.

"Take of purest Silver, flattened into plates and cut in pieces, *one part;* Diluted Nitrous Acid *two parts;* Distilled Water *one part.* Dissolve the Silver in the Acid and Water, previously mixed, in a matrass, with a gentle heat, and evaporate the solution to dryness. Then put the mass into a large crucible, and place it on the fire, which should at first be moderate, and afterwards increased by degrees until the mass flows like oil; then pour it into iron moulds previously heated and anointed with tallow. Lastly, keep it in a glass vessel very well corked." *Ed.*

"Dissolve Silver in Diluted Nitric Acid [in the manner described under *Crystals of Nitrate of Silver*]; then evaporate the solution to dryness. Melt the residuum, placed in a crucible, over a slow fire; then pour it out into proper moulds, and keep it in a glass phial." *Dub.*

During the solution of silver in nitric acid, part of the acid is decomposed into nitric oxide which is given off and becomes red fumes by contact with the atmosphere, and oxygen which oxidizes the silver. The oxide formed then combines with the remainder of the acid, and generates the nitrate of silver in solution. The water is next driven off by heat, and the salt fused and cast into little cylinders about the size of a quill. The silver should be pure, and the acid diluted for the purpose of promoting its action. The solution takes place more rapidly if the pieces of silver are rolled in a coil; as a larger surface is thus exposed to the action of the acid. If the silver contain copper, it will form a solution of a greenish tint, not disappearing on the application of heat; and if a minute portion of gold be present, it will be left undissolved as a black powder. The acid should be pure also. The commercial nitric acid, as it frequently contains both muriatic and sulphuric acids, should never be used in this process. The muriatic acid gives rise to an insoluble chloride, and the sulphuric, to the sparingly soluble sulphate of silver. The proportion of acid employed by the London and Edinburgh Colleges is unnecessarily large; and hence it has been very properly reduced in the United States formula. As the salt sinks into a common crucible, the fusion should be performed in a porcelain one, the size of which should be sufficient to hold five or six times the quantity of the dry salt operated on, in order to prevent its overflowing in consequence of the ebullition. Sometimes small portions of the liquid are spirted out, against the occurrence of which the operator should be on his guard. When the mass flows like oil, as mentioned in the Edinburgh process, it is completely fused, and ready to be poured into the moulds. These should be warmed as well as greased, as otherwise the sticks will be very brittle. The object of the covering of paper is to protect them from the decomposing influence of light, and to prevent them from discolouring the fingers.

Properties. Nitrate of silver, as prepared by the above processes, is in the form of hard, brittle sticks, of a gray colour, and an austere, metallic taste. When broken across they exhibit a crystalline fracture, and their surface often becomes dark coloured, owing either to exposure to light, to fusion at too high a temperature, or to the presence of copper. This salt is soluble in its weight of cold water, and four times its weight of boiling alcohol. Its solution stains the skin of an indelible black colour. It is decomposed at a red heat, the acid being dissipated, and the oxide reduced. When pure it is not deliquescent, and when it possesses this quality, the presence of copper may be suspected. This metal may be detected by the use of ammonia, which will cause a blue tinge if it be present. It may be separated by solution and crystallization, the pure nitrate of silver crystallizing to the exclusion of the nitrate of copper, which remains in the mother water. Nitrate of silver is decomposed by common water, soaps, the fixed alkalies and their carbonates, lime-water, sulphuric, muriatic, and tartaric acids and their salts, solution of arsenite of potassa, hydrosulphuric acid gas and its compounds, and the astringent vegetable infusions. It is an anhydrous salt, consisting of one equiv. of nitric acid 54.15, and one of oxide of silver 116=170.15.

Medical Properties and Uses. Nitrate of silver, used internally, is tonic and antispasmodic. It was formerly employed in dropsy, but its hydragogue powers are doubted by modern practitioners. The principal diseases in which it has been tried are epilepsy, chorea, angina pectoris, and other spasmodic affections. In epilepsy it has gained some celebrity as a remedy; but, though sometimes beneficial, it often fails. Its effects have been found to be most favourable in this disease when it acts on the bowels. Whenever resorted to, caution must be exercised not to continue it too long, as it is apt to weaken the stomach. An incidental disadvantage from its use, is its occasional effect of giving the skin a dark hue, approaching to black, which is difficult to remove, but which is said to yield to a steady course of cream of tartar. Externally, this salt is employed as a stimulant and escharotic, either dissolved in distilled water, or in the solid state. In the proportion of about half a grain to the fluidounce of water, it has been recommended as a mouth wash, for healing ulcers produced by the use of mercurials. Dissolved to the extent of from one to five grains in the same quantity of water, it is used for the purpose of stimulating indolent ulcers, and as an injection for fistulous sores. A solution containing two grains to the fluidounce is an excellent application in ophthalmia with ulcers of the cornea, in fetid discharges from the ear, in aphthous affections of the mouth, and in spongy gums. It is in general most conveniently applied to ulcers by means of a camel's hair pencil. A drachm of the salt dissolved in a fluidounce of water, forms an escharotic solution, which may often be resorted to with advantage. But nitrate of silver is most frequently employed, as an escharotic, in the solid state; and as it is not deliquescent, nor apt to spread, it forms the most manageable caustic that can be used. It is employed to destroy strictures in the urethra, warts, fungous flesh and excrescences, incipient chancres, and the surface of other unhealthy ulcers. It forms a most efficacious application to certain ulcerations in the throat. Mr. Higginbottom insists upon its efficacy when freely applied to ulcers, so as to cover them with an eschar, as an excellent means of expediting their cicatrization. He alleges, that if an adheren eschar is formed, the parts underneath heal before it falls off.

The dose of nitrate of silver is an eighth of a grain, gradually increased to four or five grains, three times a day. It may be given in pill or solution; but the former mode is preferable, on account of its strong and disagreeable taste. The pill is usually made with crumb of bread, but as this contains common salt, which is incompatible, some absorbent vegetable powder, with mucilage of gum Arabic, is preferable. As the fused nitrate in the form of sticks, as prepared for the use of the surgeon, is apt to be impure, it would be a good rule to resort exclusively to the crystallized nitrate for internal exhibition. The Dublin College, adopting this sentiment, has made nitrate of silver officinal in the form of crystals. (See *Argenti Nitratis Crystalli*, Dub.)

Nitrate of silver, in an over-dose, produces the effects of the corrosive poisons. The proper antidote is a solution of common salt, which acts by converting the poison into the insoluble and therefore inert chloride of silver. Consecutive inflammation must be combated by bleeding, both general and local, and other antiphlogistic remedies. B.

ARGENTI NITRATIS CRYSTALLI. *Dub.* *Crystals of Nitrate of Silver.*

"Take of Silver, laminated and cut in pieces, *thirty-seven parts;* Diluted Nitric Acid *sixty parts.* Put the Silver in a glass vessel, and pour the Acid upon it. Dissolve the metal with a heat gradually increased, and by evaporation and refrigeration let crystals be formed. Dry them without heat, and preserve them in a glass bottle in a dark place." *Dub.*

The Dublin is the only Pharmacopœia noticed in this work which has made the crystals of nitrate of silver officinal; and the motive for doing so is to have a purer salt for internal exhibition than the fused nitrate generally is. In the formula, the error of the London and Edinburgh Colleges, of using an excess of acid, has been avoided. The crystals are in thin rhomboidal plates, often of large size. Their other properties, as well as their medical applications, are the same as those of the fused nitrate, to the article on which the reader is referred. B.

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ARSENICUM.

Preparations of Arsenic.

ARSENICUM ALBUM SUBLIMATUM. *Lond.* ARSENICI OXYDUM ALBUM SUBLIMATUM. *Dub.* *Sublimed White Arsenic.*

"Reduce White Arsenic to powder; then put it into a crucible, and, applying heat, sublime it into another crucible, inverted over the first." *Lond.*

"Reduce the Oxide of Arsenic to a coarse powder, and, avoiding the vapours, expose it to heat in a suitable vessel, that the White Oxide of Arsenic may sublime." *Dub.*

The London and Dublin Colleges, deeming the commercial white oxide of arsenic (*Acidum Arseniosum, U.S.*) not sufficiently pure for medicinal employment, have given the above formulæ for its purification. But as the commercial oxide itself has undergone a second sublimation, it would seem that these processes are superfluous. The only precaution necessary to be taken on the part of the apothecary, is to purchase the oxide in lump; for when in powder it is liable to be adulterated with chalk or sulphate of lime. The chemical, medical, and toxicological properties of this oxide, have been given under the head of *Acidum Arseniosum.*

Off. Prep. Liquor Arsenicalis, *Lond.*, *Dub.* B.

LIQUOR POTASSÆ ARSENITIS. *U.S.* LIQUOR ARSENICALIS. *Lond., Dub.* SOLUTIO ARSENICALIS. *Ed.* *Solution of Arsenite of Potassa. Fowler's Solution.*

"Take of Arsenious Acid, in very fine powder, Purest Carbonate of Potassa, each, *sixty-four grains;* Distilled Water *a sufficient quantity;* Compound Spirit of Lavender *four fluidrachms;* Boil the Arsenious Acid and Carbonate of Potassa with a pint of Distilled Water, till the Acid is entirely dissolved. To the solution, when cold, add the Spirit of Lavender, and afterwards sufficient Distilled Water to make it fill up exactly the measure of a pint." *U.S.*

The formula of the *London College* is the same as the above, with the exception that the "Sublimed White Arsenic" of this College is made use of instead of the commercial oxide, the "arsenious acid" of the United States Pharmacopœia. The *Dublin College* copies the London process, reducing the quantity of the arsenious acid and carbonate, from sixty-four to sixty grains. The *Edinburgh College* takes the same quantities of acid and carbonate as are directed in the United States and London formulæ, but adds half an ounce, instead of half a fluidounce, of the spirit of lavender, and uses sufficient water to make the whole solution weigh sixteen ounces.

This preparation originated with Dr. Fowler, and was intended as a substitute for the celebrated empyrical remedy known under the name of "the tasteless ague drop." It is an arsenite of potassa dissolved in water, and is formed by the combination of the arsenious acid with the potassa of the carbonate, the carbonic acid being expelled. The name, therefore, by which it is designated in the United States Pharmacopœia, is obviously the most correct. The spirit of lavender is added to give it taste, in order to prevent its being mistaken for simple water. The United States and London preparations are of the same strength. The Dublin is weaker, in consequence of the very injudicious alteration from the standard formula, of substituting sixty instead of sixty-four grains of arsenious acid to the pint of liquid. Dr. Barker, in his Observations on the Dublin Pharmacopœia, informs us, that the reason for this change was the supposition that less danger of error would arise in weighing sixty than sixty-four grains; as the former quantity could be weighed by a single weight. On this insufficient ground, the Dublin College have made their preparation to contain one-sixteenth of arsenious acid less than the corresponding preparation of the London College. The Edinburgh preparation is also weaker than the London and United States solutions, on account of the quantity of the menstruum being greater; sixteen ounces of the liquid, the quantity prepared by the Edinburgh College, measuring about six-sevenths of a fluidounce more than a pint.

To form a perfect arsenite of potassa, theory would call for 99.4 of acid to 138.54 of the carbonate, instead of equal parts; so that the quantity directed of the latter is deficient. In making this preparation, care should be taken that the arsenious acid be pure. Sulphate of lime is a common adulteration, and if present, will remain undissolved, and cause the solution to be weaker than it ought to be.

Properties. Solution of arsenite of potassa is a transparent liquid, having the colour, taste, and smell of the spirit of lavender. It is decomposed by the usual reagents of arsenic; such as nitrate of silver, the salts of copper, lime-water, hydrosulphuric acid gas, and hydrosulphates; and is incompatible with infusions and decoctions of cinchona. The salt which it contains is a diarsenite, consisting of one equiv. of arsenious acid 99.4 and two of potassa 94.3=193.7.

Medical Properties and Uses. This solution has the general action of the arsenical preparations on the animal economy, already described under the head of *Arsenious Acid.* Its liquid form makes it convenient for exhibition and gradual increase; and it is the preparation generally resorted to, when arsenic is given internally. It is employed principally in intermittent fever. Dr. Thomas D. Mitchell, Professor of Chemistry in the Medical College of Ohio, has given the result of his experience, as to its efficacy and safety in this disease, when exhibited in the large dose of fifteen or twenty drops three times a day. (*Med. Recorder*, iv. 640.) It is a valuable resource in the intermittents of children, who are with difficulty induced to swallow sufficient quantities of bark or even sulphate of quinia. Dr. Dewees (*Phil. Journ. of Med. and Phys. Sciences*, xiv. 187,) relates the case of a child only six weeks old, affected with a severe tertian, in which this solution was given with success. A fluidrachm was diluted with twelve fluidrachms of water; and of this six drops were given every four hours.

Fowler's solution, while partaking of the general therapeutical properties of the arsenical preparations, appears to be particularly adapted to the cure of several diseases. It has been employed with encouraging success in lepra and other inveterate cutaneous affections. Dr. S. Colhoun, (*Med. Recorder*, iii. 347,) relates five cases of nodes, successfully treated by it; and in consequence of his success, Dr. Baer of Baltimore, and Professor Eberle of Cincinnati, were induced to give the remedy a trial in this affection, and with satisfactory results. Several cases of chorea, cured by this remedy, are reported by Mr. Martin, Mr. Slater, and Dr. Gregory, in the Medico-Chirurgical Transactions of London. Two interesting cures of periodical headach, performed by this solution, are related by Dr. Otto of Philadelphia, in the fourth and fifth volumes of the N. A. Medical and Surgical Journal; the first occurring in the practice of Dr. Joseph M. Alexander of North Carolina, the second under his own observation.

Each fluidrachm of the solution contains half a grain of arsenious acid. The average dose for an adult is ten drops two or three times a day. For the peculiar effects which it produces in common with the other arsenical preparations, and for the signs by which the practitioner is warned that its further exhibition would be unsafe, the reader is referred to the article on *Arsenious Acid.*

B.

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BARYTA.

Preparations of Baryta.

BARYTÆ MURIAS. *U.S., Dub.* MURIAS BARYTÆ. *Ed.* *Muriate of Baryta.*

"Take of Carbonate of Baryta, in small fragments, *a pound;* Muriatic Acid *twelve fluidounces;* Water *three pints.* Mix the Acid with the Water, and gradually add the Carbonate of Baryta till effervescence ceases. Digest for an hour and filter; then evaporate the solution, and set it aside to crystallize. Repeat the evaporation and crystallization, so long as any crystals form." *U.S.*

"Take of Sulphate of Baryta *ten parts;* Wood Charcoal, in very fine powder, or Lampblack, *one part.* Roast the Sulphate of Baryta, and throw it while still red hot into water; then reduce it to a very fine powder in the manner directed for the preparation of chalk. Mix the powders intimately, put them into a crucible, and expose them to a red heat for four hours. Dissolve the mass when cold in Distilled Water, equal to ten times the weight of the Sulphate of Baryta, and filter the solution. Add to this, avoiding the vapours, as much Muriatic Acid as may be sufficient to saturate the Baryta. Then filter the liquor, and crystallize by evaporation and refrigeration." *Dub.*

By the above formulæ, it is seen that the muriate of baryta, in the U.S. process, is obtained from the native carbonate; in that of the Dublin College, from the native sulphate. The Edinburgh College gives separate formulæ for obtaining the salt in question from either of these native sources. The process in which the carbonate is used does not materially differ from that of the U.S. Pharmacopœia; and the formula for obtaining the muriate from the native sulphate is in principle the same as the corresponding process of the Dublin College, and, therefore, need not be quoted. When the carbonate is used, the process is a case of single elective affinity; the muriatic acid combining with the baryta, and the carbonic acid being expelled with effervescence. The process in which the sulphate of baryta is employed, is more complicated. The object of the roasting and quenching in water, is to render the sulphate more easily pulverizable. The calcination with carbonaceous matter deoxidizes its constituents, converting it into sulphuret of barium, the oxygen flying off in combination with the carbon, as carbonic oxide and acid. The sulphuret of barium, when dissolved in water, is converted, by union with the elements of water, into hydrosulphate of baryta; and this by the addition of muriatic acid is decomposed, hydrosulphuric acid gas being given off in large quantities, and muriate of baryta formed in solution, from which, in the usual manner, the solid salt is obtained.

Muriate of baryta may be obtained also from the sulphate, by calcining it either with muriate of lime, or carbonate of potassa. In the former case it is directly generated by double decomposition; in the latter, carbonate of baryta is in the first instance formed, which is easily converted into the muriate by solution in muriatic acid.

Of the officinal processes, that in which the native carbonate is used is the simplest and most convenient; but as it may happen that the operator possesses the native sulphate and not the carbonate, the additional process of the Edinburgh College may sometimes prove useful.

Properties. Muriate of baryta is a permanent white salt, possessing an acrid and disagreeable taste. It crystallizes in rectangular plates with beveled edges. It dissolves in about two and a half times its weight of cold, and in a less quantity of boiling water. It is scarcely soluble in absolute alcohol, but dissolves in spirit of wine. Alcohol, impregnated with it, burns with a yellow flame. When exposed to heat, it decrepitates, dries, and melts, and is converted into chloride of barium. It is decomposed by the sulphates, oxalates, and tartrates, and the alkaline phosphates, borates, and carbonates; also by the nitrate of silver, acetate and phosphate of mercury, and the acetate of lead. When pure, it does not deliquesce. If strontia be present, its alcoholic solution will burn with a red flame. Like all th soluble salts of baryta, it is poisonous. It consists of one equiv. of muriatic acid 36.42, one of baryta 76.7, and one of water 9=122.12; or, viewed as a chloride of barium, of one equiv. of chlorine 35.42, one equiv. o barium 68.7, and two equiv. of water 18. It is used in medicine only in solution.

Off. Prep. Liquor Barytæ Muriatis, *U.S.*, *Ed.*, *Dub.* B.

LIQUOR BARYTÆ MURIATIS. *U. S.* SOLUTIO MURIATIS BARYTÆ. *Ed.* BARYTÆ MURIATIS AQUA. *Dub.* *Solution of Muriate of Baryta.*

"Take of Muriate of Baryta *an ounce;* Distilled Water *three fluidounces.* Dissolve the Muriate of Baryta in the Water." *U.S.*

"Take of Muriate of Baryta *one part;* Distilled Water *three parts.* Dissolve." *Ed., Dub.* "The sp. gr. of this solution should be 1.230." *Dub.*

The muriate of baryta not being used in the solid state, this solution is intended for its convenient exhibition. The Edinburgh and Dublin formulæ agree in dissolving the salt in three times its weight of water. The U. S. preparation is somewhat stronger; inasmuch as three fluidounces weigh about a sixth of an ounce less than three ounces. The plan of the Dublin College is a good one, of designating the strength by the specific gravity. The solution should be limpid and colourless; and to make it so, the salt in crystals, and not in powder, should be employed. It is not saturated, which is an advantage; as otherwise it would be liable to grow weaker by a fall of temperature.

Medical Properties and Uses. This solution is deobstruent and anthelmintic, and in large doses poisonous. It was introduced into practice by Dr. Crawford as a remedy for cancer and scrofula. Its value in the latter disease has been particularly insisted on by Hufeland. This physician considers it to act more particularly on the lymphatic system, in the irritated states of which he esteems it a valuable remedy. Hence he recommends it in the scrofulous affections of delicate and irritable organs, such as the eyes, lungs, &c. In the commencement of scrofulous phthisis, he views it as one of the best remedies to which we can have recourse. It is employed also in diseases of the skin, in ulcers, and ophthalmia. The dose for an adult is about five drops, given twice or thrice a day, and gradually but cautiously increased, until it produces nausea, or some other sensible impression. When taken in an over-dose it causes violent vomiting and purging, vertigo, and other dangerous symptoms. To combat its poisonous effects, recourse must be had immediately to weak solutions of sulphate of magnesia or of soda, which act by converting the poison into the insoluble sulphate of baryta. If vomiting does not come on, it should be induced by tickling the fauces, or by the administration of an emetic.

B.

BISMUTHUM.

Bismuth.

BISMUTHI SUBNITRAS. *U.S., Lond., Dub.* *Subnitrate of Bismuth.* *White Oxide of Bismuth.*

"Take of Bismuth *an ounce;* Nitric Acid *a fluidounce and a half;* Distilled Water *a sufficient quantity.* Mix six fluidrachms of Distilled Wa-er with the Nitric Acid, and dissolve the Bismuth in the mixture; then filter he solution. To the filtered liquor add three pints of Distilled Water, and et the mixture by that the powder may subside. Lastly, having poured off he supernatant fluid, wash the Subnitrate of Bismuth with Distilled Water, vrap it up in bibulous paper, and dry it with a gentle heat." *U.S.*

The *London* formula, being the original of the above process, is not ma-erially different from it, and need not be quoted.

"Take of Bismuth, in powder, *seven parts;* Diluted Nitric Acid *twenty* *parts;* Distilled Water *one hundred parts.* Add the Bismuth gradually to the Acid, and dissolve by the assistance of heat. Mix the solution with the Water, and set the mixture by that the powder may subside. Wash this with distilled water, and dry it on bibulous paper with a gentle heat." *Dub.*

When bismuth is added to dilute nitric acid, red fumes are copiously given off; and the metal, oxidized by the decomposition of part of the nitric acid, is dissolved by the remainder, so as to form a solution of the nitrate of bismuth. This solution, after being filtered, is transparent and colourless, and has a caustic, very styptic taste; and, upon the addition of water, is decomposed into the subnitrate which precipitates, and a supernitrate which remains in solution. In order to obtain a smooth and light powder, which is most esteemed, it should be washed and dried as speedily as possible. In performing the process, it is more convenient to add the nitric solution to the water, as is done by the Dublin College, than to mix in the contrary order.

Properties. Subnitrate of bismuth is in the form of an insipid inodorous powder, of a pure white colour. It is slightly soluble in water, and readily so in the strong acids, from which it is precipitated by water. The fixed alkalies dissolve it sparingly, and ammonia more readily. It is darkened by hydrosulphuric acid gas and by exposure to light, and hence requires to be kept in well stopped bottles in a dark place. By the earlier chemists it was called *magistery of bismuth.* The perfumers, by whom it is sold as a paint for the complexion, denominate it *pearl white.* It consists of oxide of bismuth combined with a small portion of nitric acid, but with how much is not exactly known.

Medical Properties and Uses. This preparation is tonic and antispasmodic. It was originally introduced into practice by Dr. Odier of Geneva, and has been subsequently employed with advantage by several physicians both of this country and of Europe. It has been recommended in epilepsy, palpitation of the heart, and spasmodic diseases generally; but more particularly in various painful affections of the stomach, dependent on disordered digestion, such as cardialgia, pyrosis, and gastrodynia. Its use always blackens the stools, from the effect of the intestinal gases. The dose is one, gradually increased to twelve or fifteen grains, twice or thrice a day, and may be taken in pill, or mixed with powdered gum Arabic. In an over-dose it produces alarming gastric distress, nausea, vomiting, diarrhœa or constipation, colic, heat in the breast, slight rigors, vertigo, and drowsiness. The remedies are bland and mucilaginous drinks; and in case of inflammation, bleeding by leeches or venesection, enemata, and emollient fomentations. B.

CALX.

Preparations of Lime.

CALX E TESTIS. *Lond.* *Oyster-shell Lime.*

The *London College* prepares this in the manner directed for the preparation of lime from white marble, which is as follows. "Take of Whit Marble *a pound.* Break it into small fragments, and heat it in a crucible i a very strong fire for an hour, or until the carbonic acid is entirely expelled so that upon the addition of diluted acetic acid no effervescence may be produced."

When oyster-shells are exposed to a strong fire with the access of air, th animal matter is consumed, the carbonic acid driven off, and lime is left much purer than that obtained from limestone, but still containing a minute proportion of magnesian phosphate of lime and oxide of iron, which, according to Vauquelin, are associated in the shells with the carbonate of lime. The pharmaceutist may sometimes find advantage in resorting to this preparation in certain delicate chemical processes; but common lime is sufficiently pure for ordinary medicinal purposes. W.

LIQUOR CALCIS. *U.S., Lond.* Solutio Calcis, sive Aqua Calcis. *Ed.* Aqua Calcis. *Dub.* *Lime-water.*

"Take of Lime *four ounces* [half a pound, *Lond.*]; Distilled Water *a gallon* [twelve pints, *Lond.*] Pour the Water upon the Lime and stir them together; then immediately cover the vessel and set it aside for three hours. Keep the solution, together with the undissolved Lime, in stopped glass bottles, and pour off the clear liquor when it is wanted for use." *U.S., Lond.*

"Take of fresh burnt Lime *half a pound.* Sprinkle on it, in an earthen vessel, *four ounces* of Water, keeping the vessel covered while the lime grows hot and falls into powder; then pour on it *twelve pounds* of water, and mix the lime thoroughly with the water by agitation. After the lime has subsided, repeat the agitation, and do this about ten times, always keeping the vessel covered, that the free access of air may be prevented. Lastly, filter the water through paper, interposing glass rods between it and the funnel, that the solution may pass as quickly as possible. It should be kept in very closely stopped bottles." *Ed.*

"Take of fresh burnt Lime, boiling Water, each, *one part.* Put the Lime into an earthen vessel, and sprinkle the Water upon it, keeping the vessel closed while the Lime grows hot and falls into powder; then pour upon it *thirty parts* of cold water, and having again closed the vessel, shake the mixture frequently for twenty-four hours; lastly, after the lime has subsided pour off the clear solution, and keep it in closely stopped bottles." *Dub.*

A solution of lime in water is the result of these processes. The Edinburgh and Dublin Colleges first slake the lime, which is thus reduced to powder, and rendered more easily diffusible through the water employed to dissolve it. In other respects, the process of the U.S. and London Pharmacopœias is preferable. According to this, the solution is to be kept in bottles with a portion of undissolved lime, which causes it always to be saturated, whatever may be the temperature, and to whatever extent it may be exposed to the air. By taking care to have a considerable quantity of the solution in the bottle, and avoiding unnecessary agitation, the upper portion will always remain sufficiently clear for use. The employment of Distilled Water as the solvent may seem a useless refinement; and it certainly is unnecessary when pure spring or river water is attainable; but in many places the common water is very impure, and wholly unfit for a preparation, one of the most frequent uses of which is to allay irritability of stomach. Water dissolves but a minute proportion of lime, and contrary to the general law, less when hot than cold. The employment of boiling water, directed in the original edition of the U.S. Pharmacopœia, is, therefore, improper, or at least unnecessary. According to Mr. Phillips, a pint of water at 212° dissolves 5.6 grains of lime, at 60°, 9.7 grains, and at 32°, 11.0 grains. When a cold saturated solution is heated, a deposition of lime takes place.

Properties. Lime-water is colourless, inodorous, and of a disagreeable alkaline taste, changes vegetable blues to green, and forms an imperfect soap with oils. Exposed to the air it attracts carbonic acid, and becomes covered with a pellicle of insoluble carbonate of lime, which, subsiding after a time, is replaced by another, and so on successively till the whole of the lime is exhausted. Hence the necessity of keeping lime-water either in closely corked bottles which should be full, or, what is more convenient, in bottles with an excess of lime.

Medical Properties and Uses. Lime-water is antacid, tonic, and astringent, and is very usefully employed in dyspepsia with acidity of stomach, diarrhœa, diabetes, and gravel attended with superabundant secretion of uric acid. Mixed with an equal measure of milk, which completely covers its offensive taste, it is one of the best remedies in our possession for nausea and vomiting dependent on irritability of stomach. We have found a diet exclusively of lime-water and milk to be more effectual than any other plan of treatment in dyspepsia accompanied with vomiting of food. In this case one part of the solution to two or three parts of milk is usually sufficient. Lime-water is also thought to be useful by dissolving the intestinal mucus in cases of worms and other complaints connected with an excess of this secretion. Externally it is employed as a wash in tinea capitis and scabies, as an application to foul and gangrenous ulcers, as an injection in leucorrhœa and ulceration of the bladder or urethra, and, mixed with linseed or olive oil, as a liniment in burns and scalds.

The dose is from two to four fluidounces taken several times a day. When employed to allay nausea, it is usually given in the dose of a tablespoonful mixed with the same quantity of new milk, and repeated every twenty or thirty minutes. If too long continued it debilitates the stomach.

Off. Prep. Aqua Calcis Composita, *Dub.*; Infusum Sarsaparillæ Compositum, *Dub.*; Linimentum Calcis, *U.S.*, *Ed.*, *Dub.* W.

AQUA CALCIS COMPOSITA. *Dub.* *Compound Lime-water.*

"Take of Guaiacum Wood, rasped, *half a pound;* Liquorice Root, sliced and bruised, *an ounce;* Sassafras Bark, bruised, *half an ounce;* Coriander Seeds *three drachms;* Lime-water *six pints.* Macerate without heat, for two days, in a close bottle, occasionally shaking, and filter." *Dub.*

This is a very inert preparation, and should be ranked among the infusions, as the lime-water can scarcely fail to be decomposed during the process. W.

CALCIS CARBONAS PRÆCIPITATUM. *Dub.* *Precipitated Carbonate of Lime.*

"Take of Water of Muriate of Lime *five parts.* Add *three parts* of Carbonate of Soda, dissolved in four times its weight of Distilled Water. Wash the precipitate three times with a sufficient quantity of water; then collect it and dry it on a chalk-stone, or on bibulous paper." *Dub.*

In this process a mutual interchange of principles takes place, resulting in the production of the muriate of soda which remains in solution, and the carbonate of lime which precipitates. Of the crystallized carbonate of soda, 143.42 parts decompose 55.92 of the chloride of calcium. The Dublin Water of Muriate of Lime contains two parts in nine of chloride of calcium. From these data it may be deduced, that the carbonate of soda in this formula is in very slight excess. The Precipitated Carbonate of Lime is very pure and finely divided, but probably has no such superiority over prepared chalk as to counterbalance its greater expensiveness.

Off. Prep. Hydrargyrum cum Cretâ, *Dub.* W.

CALCIS CARBONAS PRÆPARATUS. *U.S.* CRETA PRÆPARATA. *Lond., Dub.* CARBONAS CALCIS PRÆPARATUS. *Ed.* *Prepared Carbonate of Lime. Prepared Chalk.*

"Take of Carbonate of Lime [Chalk, *Lond.*] *a pound.* Add a little Water to the Carbonate of Lime [Chalk, *Lond.*], and rub it into a fine powder. Throw this into a large vessel full of water; then stir it, and, after a short interval, pour the supernatant liquor, while yet turbid, into another vessel, and set it by that the powder may subside; lastly, having poured off the water, dry the powder." *U.S., Lond.*

"Carbonate of Lime, after having been rubbed to powder in an iron mortar, and levigated with a little water on a porphyry stone, is to be put into a large vessel, and water to be poured upon it, which, after the vessel has been frequently shaken, is to be poured off loaded with the fine powder. The subtile powder, which subsides when the water is allowed to rest, is to be dried. The coarse powder, which the water could not suspend, may be again levigated, and treated in the same manner." *Ed.*

"Take of Chalk *any quantity.* Rub it to powder in an earthenware mortar, with the addition of a little water; then mix it with a sufficiently large quantity of water by agitation, and after a short interval, when the coarser particles have subsided, pour off the liquor. This may be several times repeated, each time after trituration. Finally, collect the very fine powder, which after some time will subside, and dry it upon an absorbent stone or paper." *Dub.*

The object of these processes is to reduce chalk to very fine powder. The mineral, previously pulverized, is rubbed with a little water upon a porphyry slab by means of a rubber of the same material, and having been thus very minutely divided, is agitated with water, which upon standing a short time deposites the coarser particles, and being then poured off, slowly lets fall the remainder in an impalpable state. The former part of the process is called *levigation*, the latter *elutriation.* The soft mass which remains after the decanting of the clear liquor, is made to fall upon an absorbent surface in small portions, which when dried have a conical shape.

Medical Properties and Uses. This is the only form in which chalk is used in medicine. It is an excellent antacid; and as the salts which it forms in the stomach and bowels are not purgative, it is admirably adapted to diarrhœa accompanied with acidity. It is frequently employed as an application to burns and ulcers, the ichorous discharge from which it absorbs, and thus prevents from irritating the diseased surface or the sound skin. It probably also does good, in these cases, by a peculiar action upon the part to which it is applied. It is given internally in the form of powder, or suspended in water by the intervention of gum Arabic and sugar. (See *Mistura Calcis Carbonatis.*) The dose is from ten to forty grains or more.

Off. Prep. Confectio Aromatica, *Dub.;* Hydrargyrum cum Calcis Carbonate, *U.S. Lond., Dub.;* Mistura Calcis Carbonatis, *U.S., Lond., Ed., Dub.;* Pulvis Cretæ Compositus, *Lond., Ed., Dub.;* Pulvis Opiatus, *Ed.;* Trochisci Calcis Carbonatis, *U.S., Ed.*

W.

TESTA PRÆPARATA. *U.S.* TESTÆ PRÆPARATÆ. *Lond.* *Prepared Oyster-shell.*

"Take of Oyster-shell *any quantity.* Free it from extraneous matter, and wash it with boiling water; then prepare it in the manner directed for Carbonate of Lime." *U.S., Lond.*

Prepared oyster-shell differs from prepared chalk in containing animal matter, which being very intimately blended with the carbonate of lime, is supposed by some physicians to render the preparation more acceptable to a delicate stomach. It is given as an antacid in diarrhœa, in the dose of from ten to thirty grains frequently repeated.

Off. Prep. Confectio Aromatica, *Lond.* W.

LIQUOR CALCIS MURIATIS. *U.S., Lond.* SOLUTIO MURIATIS CALCIS. *Ed.* CALCIS MURIATIS AQUA. *Dub.* *Solution of Muriate of Lime.*

"Take of Hard Carbonate of Lime [White Marble], broken into pieces, *nine ounces;* Muriatic Acid *sixteen ounces;* Distilled Water *a sufficient quantity.* Mix the Acid with half a pint of the Distilled Water, and gradually add the Carbonate of Lime. When the effervescence shall have ceased, digest for an hour; then pour off the liquor, and evaporate to dryness. Dissolve the residuum in its own weight and a half of the Distilled Water, and filter the solution." *U.S.*

The *London College* dissolves *two ounces* of muriate of lime (chloride of calcium) in *three fluidounces* of distilled water, and filters through paper. The *Edinburgh* process is essentially the same as that of the U.S. Pharmacopœia; which was copied from it with slight variations to adapt it to the plan of the work. The *Dublin College* dissolves two parts of muriate of lime (chloride of calcium) in seven parts of distilled water, and states the sp. gr. of the solution at 1.202.

By the U.S. and Edinburgh processes a chloride of calcium is first formed, and then, as in the processes of the London and Dublin Colleges, dissolved in a certain proportion of water. As the chloride by its union with the elements of water, is converted into muriate of lime, the solution properly takes the name by which it is designated above. The U.S., London, and Edinburgh preparations agree very nearly in strength, containing 1 part of the chloride in 2.5 parts of the solution. The Dublin contains only 1 part in 4.5, and is therefore little more than half as strong as the others.

The solution of muriate of lime has a disagreeable, bitter, acrid taste. It is decomposed by sulphuric acid and the soluble sulphates; by potassa, soda, and their carbonates; by carbonate of ammonia, tartrate of potassa and soda, nitrate of silver, nitrate and acetate of mercury, and acetate of lead. The mode of preparing chloride of calcium and its chemical properties, are detailed under the head of *Calcii Chloridum* in the Materia Medica.

Medical Properties and Uses. The muriate of lime is considered tonic and deobstruent. It was first brought into notice as a remedy by Fourcroy, and was at one time much used in scrofulous diseases and goitre. It still continues to be a favourite with some physicians, but is less employed than formerly. When too largely taken it sometimes produces nausea, but is a much safer remedy than the muriate of baryta which has been recommended in the same complaints. The dose of the solution is from thirty minims or drops to a fluidrachm, to be repeated twice or three times a day, and gradually increased to two, three, or even four fluidrachms. It may be given in milk or sweetened water.

Off. Prep. Calcis Carbonas Præcipitatum. *Dub.* W.

CALCIS PHOSPHAS PRÆCIPITATUM. *Dub.* *Precipitated Phosphate of Lime.*

"Take of Burnt Bones, in powder, *one part;* Diluted Muriatic Acid, Water, each, *two parts.* Digest together for twelve hours, and filter the solution. Add as much Water of Caustic Ammonia as will be sufficient to precipitate the Phosphate of Lime. Wash this with a large proportion of water, and finally dry it." *Dub.*

The muriatic acid dissolves the phosphate of lime of the bones, and lets it fall on the addition of ammonia, in a state of minute division. The ablution is intended to free it from any adhering muriate of ammonia. Thus obtained, phosphate of lime is in the form of a white powder, without taste or smell, insoluble in water, but very soluble in nitric, muriatic, and acetic acids, from which it is precipitated unchanged on the addition of ammonia.

If this preparation possesses any advantage over burnt hartshorn, it is in the state of minute division to which it has been brought by precipitation. It may be given in the same complaints and in the same dose; but is probably quite inert. (See *Cornu Ustum.*) W.

CORNU USTUM. *Lond.* PULVIS CORNU CERVINI USTI. *Dub.* *Burnt Hartshorn.*

"Burn pieces of Hartshorn in an open fire until they are thoroughly white; then powder them, and prepare them in the manner directed for Chalk." *Lond.*

The *Dublin College* gives similar directions.

The horn must not only be heated, but also burnt, in order that the animal matter may be entirely consumed. The operation may be performed in a common furnace or stove, the air being freely admitted. Care should be taken that the heat be not too violent, as otherwise the external surface of the horn may become vitrified, and prevent the complete combustion of the interior portion, while it is itself rendered less fit for use. Burnt hartshorn consists of phosphate of lime, with a minute proportion of lime, derived from the carbonate contained in the horns. It may be inferred, from the analysis of hartshorn by M. Guillot, that the proportion of free lime in this preparation is less than one per cent. (See *Cornu Cervi Elaphi.*)

Medical Properties and Uses. The opinion formerly entertained, that burnt hartshorn was antacid, has been abandoned since the discovery of its chemical nature. Its composition suggested its application to the cure of rachitis and mollities ossium, of which the prominent character is a deficiency of phosphate of lime in the bones; and it is said to have been employed in some cases, in connexion with phosphate of soda, with apparent success. Experience, however, has not confirmed the first report in its favour. It is probably altogether inert. The dose is twenty grains or more.

Off. Prep. Mistura Cornu Usti, *Lond.*; Pulvis Cornu Cervi cum Opio, *Lond.* W.

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CATAPLASMATA.

Cataplasms.

Cataplasms or poultices are moist substances intended for external application, of such a consistence as to accommodate themselves accurately to the surface to which they are applied, without being so liquid as to spread over the neighbouring parts, or so tenacious as to adhere firmly to the skin. As they are in this country scarcely ever prepared by the apothecary, they were not deemed by the compilers of the United States Pharmacopœia proper objects for officinal direction. W.

CATAPLASMA ALUMINIS. *Dub.* *Alum Cataplasm.*

"Take the Whites of *two* Eggs; of Alum *a drachm.* Shake them together so as to make a coagulum." *Dub.*

A common mode of preparing the alum poultice, is to rub the whites of eggs briskly in a saucer with a lump of alum till the liquid coagulates. The curd produced by coagulating milk with alum is sometimes used as a substitute.

The alum cataplasm is an astringent application, occasionally employed in incipient, purulent, or chronic ophthalmia. It is placed over the eye enclosed between folds of cambric or soft linen. It is also esteemed useful in chilblains when the skin is not broken. W.

CATAPLASMA CARBONIS LIGNI. *Dub.* *Charcoal Cataplasm.*

"Take a sufficient quantity of Wood Charcoal red hot from the fire, and having extinguished it by sprinkling dry sand over it, reduce it to very fine powder, and incorporate it with the Simple Cataplasm in a tepid state." *Dub.*

Charcoal, recently prepared, has the property of absorbing and neutralizing those principles upon which the offensive odour of putrefying animal substances depends. In the form of poultice it is an excellent application to foul and gangrenous ulcers, correcting their fetor, and improving the condition of the sore. It should be frequently renewed. W.

CATAPLASMA CONII. *Dub.* *Hemlock Cataplasm.*

"Take of Dried Hemlock Leaves *an ounce;* Water *a pint and a half.* Boil down to a pint, and having strained the liquor, add as much of the powdered leaves as may be sufficient to form a cataplasm." *Dub.*

This cataplasm may be advantageously employed as an anodyne application to cancerous, scrofulous, syphilitic, and other painful ulcers: but its liability to produce narcotic effects by the absorption of the active principle of the hemlock, should not be overlooked. W.

CATAPLASMA DAUCI. *Dub.* *Carrot Cataplasm.*

"Take of the Root of the cultivated Carrot *any quantity.* Boil the root in water until it becomes sufficiently soft to form a cataplasm." *Dub.*

Emollient poultices may be prepared from any of the tender culinary roots, from turnips and potatoes as well as carrots, by boiling them, removing the external skin, and mashing them into a soft pulp, which may be rendered uniform by pressing it through a coarse sieve or cullender. But these poultices possess no specific power, and act on the same principles with those made with bread and milk, and flaxseed meal.

The carrot cataplasm, when designed to produce a peculiar impression, should be made by grating the fresh roots into a pulp. In this state it possesses a slightly stimulant property, which renders it useful in weak, flabby, ill-conditioned, and offensive ulcers. By boiling, this property is diminished, if not lost; and the carrot becomes a mild and nutritive article of food. W.

CATAPLASMA FERMENTI. *Lond.* CATAPLASMA FERMENTI CEREVISIÆ. *Dub.* *Yeast Cataplasm.*

"Take of Flour [wheat flour] *a pound;* Yeast *half a pint* [half a pound, *Dub.*] Mix and expose the mixture to a gentle heat until it begins to rise." *Lond.*, *Dub.*

By exposing a mixture of yeast and flour to a gentle heat, fermentation takes place, and carbonic acid gas is extricated, which causes the mixture to swell, and is the source of its peculiar virtues. The yeast cataplasm is gently stimulant, and is sometimes applied with much benefit to foul and gangrenous ulcers, the fetor of which it corrects, while it is supposed to hasten the separatiou of the slough. W.

CATAPLASMA SIMPLEX. *Dub.* *Simple Cataplasm.*

"Take of the powder for a Cataplasm *any quantity;* Boiling Water sufficient to form a tepid cataplasm, the surface of which should be covered with olive oil." *Dub.*

The Dublin "Powder for a Cataplasm," consists of one part of flaxseed meal remaining after the expression of the oil, and two parts of oat meal. The flaxseed meal which has not been submitted to pressure is decidedly preferable, and answers an excellent purpose when mixed with boiling water, without other addition. Fresh lard or olive oil spread upon the surface of the poultice serves to prevent its adhesion to the skin, and to preserve its softness.

The use of this and other emollient cataplasms is to relieve the tense condition of the vessels in inflammation, and to promote suppuration. They act simply by their warmth and moisture. The one most extensively employed, perhaps because its materials are always at hand, is that prepared by heating together milk and the crumb of bread. The milk should be quite sweet, and fresh lard should be incorporated with the poultice. Mush made with the meal of Indian corn also forms an excellent emollient cataplasm. W.

CATAPLASMA SINAPIS. *Lond., Dub.* *Mustard Cataplasm.*

"Take of Mustard Seed, Linseed [flaxseed], each, in powder, *half a pound;* Hot Vinegar *a sufficient quantity.* Mix, until they acquire the consistence of a cataplasm." *Lond.*

The *Dublin College* orders the same seeds in the same proportion, and states that the cataplasm may be made more stimulating by the addition of two ounces of scraped horse-radish.

The simplest and most effectual mode of preparing a mustard poultice, is to mix the powdered mustard of the shops with a sufficient quantity of warm water to give it a due consistence. When a weaker preparation is required, an equal portion or more of rye or wheat flour should be added. Vinegar never increases its efficiency, and in the case of the black mustard seed, has been ascertained by MM. Troupeau and Blanc to diminish its rubefacient power. (See *Sinapis.*)

These poultices are frequently called *sinapisms.* They are powerfully rubefacient, exciting a sense of warmth in a few minutes, and usually becoming insupportably painful in less than an hour. When removed, they leave the surface intensely red and burning; and the inflammation frequently terminates in desquamation, or even blistering, if the application has been too long continued. Obstinate ulcers and gangrene also sometimes result from the protracted action of mustard, especially on parts possessed of little vitality. As a general rule, the poultice should be removed when the patient complains much of the pain; and in cases of insensibility should not, unless greatly diluted, be allowed to remain longer than one, or at most two hours; as violent inflammation, followed by obstinate ulceration, is apt to occur upon the establishment of reaction in the system. In children also particular care is necessary to avoid this result. The poultice should be thickly spread on linen, and may be covered with gauze or unsized paper in order to prevent its adhesion to the skin. If hairs are present they should be removed by the razor. Sinapisms may be employed in all cases in which it is desirable to produce a very speedy and powerful rubefacient impression. W.

CERATA.

Cerates.

These are unctuous substances consisting of oil or lard, united with wax, spermaceti, or resin, to which various medicaments are frequently added. Their consistence, which is intermediate between that of ointments and of plasters, is such that they may be spread at ordinary temperatures upon linen or leather, by means of a spatula, and do not melt or run when applied to the skin. In preparing them, care should usually be taken to select the oil or lard perfectly free from rancidity. W.

CERATUM ARSENICI. *U.S.* *Cerate of Arsenic.*

"Take of Arsenious Acid, in very fine powder, *a scruple;* Simple Cerate *an ounce.* Mix the Acid with the Cerate, previously softened by heat."

This is sometimes employed as a dressing to cancerous ulcers. Its effects should be carefully watched; and if constitutional symptoms appear, its use should be suspended. W.

CERATUM CANTHARIDIS. *U.S.* EMPLASTRUM CANTHARIDIS. *Lond., Dub.* EMPLASTRUM CANTHARIDIS VESICATORIÆ. *Ed.* *Cerate of Spanish Flies.* EMPLASTRUM EPISPASTICUM. *Blistering Plaster.*

"Take of Spanish Flies, in powder, *a pound*; Yellow Wax, Resin, Olive Oil, each, *eight ounces.* To the Wax, Resin, and Oil, previously melted together, add the Spanish Flies, and stir the mixture constantly until cool." *U.S.*

The *London College* orders a pound of Spanish flies, a pound and a half of wax plaster, and half a pound of lard; the *Edinburgh*, equal weights of flies, suet, yellow wax, and white resin; and the *Dublin*, a pound of flies, a pound of yellow wax, four ounces of yellow resin, half a pound of suet, and half a pound of lard.

This is the common *blistering plaster* of the shops. As it can be readily spread without the aid of heat, it is properly a cerate, and is therefore correctly named in the U.S. Pharmacopœia. Though essentially the same in character as prepared by the different processes, it varies somewhat in strength. The U.S. and London preparations have the same proportion of flies, but are stronger than those of the Edinburgh and Dublin Colleges. One of the two former therefore is preferable, and our own has this advanvantage, that it does not require the previous preparation of the wax plaster. Care is requisite in making the cerate not to injure the flies by heat. They should not, therefore, be added to the other ingredients until immediately before these begin to stiffen after having been removed from the fire. It is desirable also that the flies should be very finely powdered.

The cerate is the most convenient form in which cantharides can be applied for the purpose of raising a blister, and it is always effectual in ordinary conditions of the system, if the flies are good and not injured in the preparation. It should be spread on soft leather, though linen or even paper will answer the purpose when this is not to be had. An elegant mode of preparing it for use, is to spread a piece of leather of a proper size first with adhesive plaster, and afterwards with the cerate, leaving a margin of the former uncovered, in order that it may adhere to the skin. Heat is not requisite, and should not be employed in spreading the cerate. It is customary with some to sprinkle powdered flies upon the surface of the plaster, press them lightly with a roller, and then shake off the portion which has not adhered; but if the flies originally employed were good, this addition is superfluous.

Upon the application of the plaster, the skin should be moistened with warm vinegar or other liquid; and a good rule is to cover the surface of the plaster closely with very thin gauze or unsized paper, which prevents any of the cerate from adhering to the cuticle. In the cases of adults, when the full operation of the flies is desirable, and the object is to produce a permanent effect, the application should be continued for twelve hours, and upon the scalp for twenty-four hours. In very delicate persons, however, or those subject to strangury, or upon parts of a loose texture, or when the object is merely to produce a blister to be healed as speedily as possible, the plaster should remain no longer than is necessary for the production of full redness of the skin, which generally occurs in five or six hours, or even in a shorter time. It should then be removed, and followed by a bread and milk poultice, or some other emollient dressing, under which the cuticle rises, and a full blister is usually produced.* By this management the patient will generally escape strangury, and the blister will very quickly heal after the discharge of the serum. In young children, cantharides sometimes produce alarming and even fatal ulceration, if too long applied. From two to four hours are usually sufficient to answer any desirable purpose. When the head, or other very hairy part is to be blistered, an interval of ten or twelve hours should, if possible, be allowed between the shaving of the part and the application of the plaster; so that the abrasions of the cuticle may heal, and some obstacle be offered to the absorption of the active principle of the flies. After the blister has been formed, it should be opened at the most depending parts, and, the cuticle being allowed to remain, should be dressed with simple cerate; but if it be desirable to maintain the discharge for a short time, resin cerate should be used, and the cuticle removed, if it can be done without inconvenience. The effects of an issue may be obtained by employing savine ointment, or the ointment of Spanish flies, as a dressing. If much inflammation should take place in the blistered surface, it may be relieved by emollient poultices, or weak lead water. Where there is an obstinate indisposition to heal, we have found nothing so effectual as the cerate of subacetate of lead, combined with an equal weight of simple cerate. When deep and extensive ulceration occurs in consequence of general debility, Peruvian bark or sulphate of quinia should be used with nutritious aliment.

A solution of cantharidin in olive oil, applied to the skin by means of a piece of paper saturated with it, has been proposed by the French pharmaceutists as a substitute for the ordinary blistering plaster; but if pure cantharidin is used, the preparation would be too expensive. A decoction of the flies in olive oil or oil of turpentine, would answer the same purpose; but is not likely to supersede the cerate.

It is said that by ebullition in water, the flies are deprived of their property of producing strangury, while their vesicating powers remain unaltered. (*Paris's Pharmacologia.*) Dr. Theophilus Beasly of Philadelphia, has been in the habit of employing a cerate made with cantharides prepared in this manner, and has never known it to produce strangury in more than two or three instances. He boils the *unpowdered flies* for fifteen minutes, esteeming a shorter time insufficient to deprive them of this property, while if the boiling be continued much longer, their blistering power is impaired. (*Journ. of the Phil. Col. of Pharm.* iv. 185.) In a letter addressed to one of the authors by Dr. James Couper of Newcastle, Delaware, a similar method of preparing the flies is recommended as an expedient against strangury, both from his own experience and that of the late Dr. Groom of Elkton, Maryland, from whom he derived his knowledge of the plan. Dr. Groom's method was to pour upon the flies in their perfect state sufficient boiling water completely to cover them, to stir them for about five minutes, then to pour off the liquor and dry them upon blotting paper, in the sun, or by the heat of a stove-room. W.

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* Dr. M. B. Smith of Philadelphia has informed us that he has frequently employed uva ursi as a preventive of strangury from blisters, and has never found it to fail. He gives a small wineglassful of the officinal decoction, (see *Decoctum Uvæ Ursi,*) every hour, commencing two hours after the application of the blister.

CERATUM CETACEI. *U.S., Lond.* CERATUM SIMPLEX. *Ed.* UNGUENTUM CETACEI. *Dub.* *Spermaceti Cerate.*

"Take of Spermaceti *an ounce;* White Wax *three ounces;* Olive Oil *six fluidounces.* Melt together the Spermaceti and Wax; then add the Oil previously heated, and stir the mixture until cool." *U.S.*

The *London College* directs half an ounce of Spermaceti, two ounces of white wax, and four fluidounces of olive oil; the *Edinburgh*, six parts of olive oil, three parts of white wax, and one part of spermaceti; the *Dublin*, half a pound of white wax, a pound of spermaceti, and three pounds of lard.

The direction to heat the oil before adding it to the other ingredients is peculiar to our Pharmacopœia. If added cold, it is apt to produce an irregular congelation of the wax and spermaceti, and thus to render the preparation lumpy. This cerate is employed as a dressing for blisters, excoriated surfaces, and wounds; and as the basis of more active preparations. When the ingredients are pure and sweet, it is perfectly free from irritating properties.

Off. Prep. Ceratum Cantharidis, *Lond.;* Ceratum Carbonatis Zinci Impuri, *Ed.* W.

CERATUM PLUMBI CARBONATIS. *U.S.* *Cerate of Carbonate of Lead.*

"Take of Plaster of Carbonate of Lead *ten ounces;* Olive Oil *two fluidounces.* Add the Oil to the Plaster previously melted, and stir them constantly until cool." *U.S.*

This is useful as a desiccative and sedative application to excoriated and irritated surfaces. W.

CERATUM PLUMBI SUBACETATIS. *U.S.* CERATUM PLUMBI COMPOSITUM. *Lond.* *Cerate of Subacetate of Lead. Goulard's Cerate.*

"Take of Solution of Subacetate of Lead *two fluidounces and a half;* Yellow Wax *four ounces;* Olive Oil *nine fluidounces;* Camphor *half a drachm.* Mix the Wax, previously melted, with eight fluidounces of the Oil; then remove the mixture from the fire, and when it begins to thicken, gradually pour in the Solution of Subacetate of Lead, stirring constantly with a wooden spatula till it becomes cool. Lastly, add the Camphor dissolved in the remainder of the Oil and mix." *U.S., Lond.*

This preparation received the name by which it is commonly known, from M. Goulard, by whom it was employed and recommended. It is used to dry up excoriations, to relieve the inflammation of burns, scalds, and chilblains, and to remove cutaneous eruptions. We have found it more effectual than any other application to blistered surfaces indisposed to heal; and, on the recommendation of Dr. Parrish, have used it in the following combination with advantage in various cutaneous eruptions of a local character. Take of cerate of subacetate of lead, simple cerate, each, *half an ounce;* calomel, powdered opium, each, *a drachm;* mix them. The same preparation, without the opium, was a favourite remedy with the late Dr. Wistar in similar complaints.

W.

CERATUM RESINÆ. *U.S., Lond.* UNGUENTUM RESINOSUM. *Ed.* UNGUENTUM RESINÆ ALBÆ. *Dub.* *Resin Cerate.*

"Take of Resin *five ounces;* Lard *eight ounces;* Yellow Wax *two ounces.* Melt them together, and stir them constantly until cool." *U.S.*

The proportions directed by the *Edinburgh College* are the same as the above. The *London College* orders of yellow resin and yellow wax, each, a pound, and of olive oil a pint. The resin and wax are melted together over a slow fire, the oil then added, and the mixture while hot strained through linen. By the *Dublin* process, four pounds of lard, two pounds of white resin, and one pound of yellow wax are made into an ointment, and strained while hot through a sieve.

As resin often contains impurities, the cerate should be strained before it cools.

Resin cerate, commonly called *basilicon ointment*, is much used as a gently stimulant application to blistered surfaces, indolent ulcers, burns, scalds, and chilblains. We have found no application more effectual in disposing the ulcers which follow burns to heal.

Off. Prep. Ceratum Sabinæ, *U.S.;* Linimentum Terebinthinæ, *U.S., Lond., Dub.;* Unguentum Cantharidis, *U.S., Lond., Ed., Dub.;* Unguentum Cupri Subacetatis, *Dub., Ed.*

W.

CERATUM RESINÆ COMPOSITUM. *U.S.* *Compound Resin Cerate.*

"Take of Resin, Suet, Yellow Wax, each, *a pound;* Turpentine *half a pound;* Flaxseed Oil *half a pint.* Melt them together, and stir them constantly until cool." *U.S.*

This should be strained through linen before cooling, in order to separate the impurities. It is somewhat more stimulating than the preceding, but is applicable to similar purposes, particularly to the treatment of indolent ulcers. Under the name of *Deshler's salve,* it is popularly employed in some parts of the United States.

W.

CERATUM SABINÆ. *U.S., Lond.* CERATUM JUNIPERI SABINÆ. *Ed.* UNGUENTUM SABINÆ. *Dub.* *Savine Cerate.*

"Take of Savine, in powder, *two ounces;* Resin Cerate *a pound.* Mix the Savine with the Cerate previously softened." *U.S.*

The *London College* orders one pound of fresh savine leaves, bruised, to be boiled with half a pound of yellow wax and two pounds of lard previously melted together, and the whole to be strained through linen. The *Edinburgh* process is essentially the same. The *Dublin College* employs only half a pound of the leaves, which it directs to be boiled in the lard till they become crisp; the lard is then to be strained with expression, the wax added, and the whole melted together.

As the savine used in this country is generally brought from Europe in the dried state, we are compelled to resort to the mode of preparing the cerate directed in the U.S. Pharmacopœia. Nor have we found the preparation thus made to be "intolerably acrid and almost caustic," as Dr. Duncan describes it. On the contrary, it answers very well the purpose for which it is used—that of maintaining the discharge from blistered surfaces. A cerate prepared in the same manner from the leaves of the red cedar (*Juniperus Virginiana*) is sometimes substituted for that of savine, but is less efficient. It was originally introduced into the U.S. Pharmacopœia, but has been omitted in the last edition.

Prepared according to the processes of the British Colleges, savine cerate has a fine deep green colour, and the odour of the leaves. It should be kept in closely covered vessels, as its virtues are impaired by exposure.

Savine cerate is preferable to the ointment of Spanish flies as a dressing for perpetual blisters, from the circumstance that it has no tendency to produce strangury. The white coating which forms during its use upon the blistered surface should be occasionally removed, as it prevents the contact of the cerate. W.

CERATUM SAPONIS. *U.S., Lond.* *Soap Cerate.*

"Take of Soap *eight ounces;* Yellow Wax *ten ounces;* Semivitrified Oxide of Lead, in powder, *a pound;* Olive Oil *a pint;* Vinegar *a gallon.* Boil the Vinegar with the Oxide of Lead over a slow fire, constantly stirring, till the union is complete; then add the Soap, and again boil in a similar manner, until all the moisture is dissipated; lastly, with these ingredients mix the Wax previously melted with the Oil." *U.S., Lond.*

In this process, the subacetate of Lead formed by the action of the vinegar upon the litharge, is decomposed by the soap, the soda of which unites with the acetic acid, and the oil with the oxide of lead in the same manner as in the formation of the Emplastrum Plumbi. The wax and oil subsequently added merely serve to give due consistence to the preparation. Soap cerate is thought to be cooling and sedative; and is sometimes used in scrofulous swellings and other instances of chronic external inflammations. It was formerly employed by Mr. Pott as a dressing for fractured limbs; but answers no other purpose in these cases than to yield mechanical support. W.

CERATUM SIMPLEX. *U.S., Lond.* *Simple Cerate.*

"Take of Lard *eight ounces;* White Wax *four ounces.* Melt them together, and stir them constantly until cool." *U.S.*

The *London College* directs that four fluidounces of olive oil be mixed with four ounces of yellow wax previously melted.

We prefer the formula of the U.S. Pharmacopœia. Lard is preferable to olive oil, as it may always be had perfectly sweet, and is the mildest application which can be made to irritated surfaces. In the preparation of this cerate, peculiar care should be observed that the oleaginous ingredient be entirely free from rancidity, and that the heat employed be not sufficient to produce the slightest decomposition; for the value of the preparation depends on its perfect blandness. It is used for dressing blisters, wounds, &c., in all cases in which the object is to exclude the external air and preserve the moisture of the part, and at the same time to avoid all irritation. It is sometimes improperly employed as the vehicle of substances to be applied by inunction. For this purpose lard should be used in winter, and simple ointment in summer; the cerate having too firm a consistence. W.

CERATUM ZINCI CARBONATIS. *U.S.* CERATUM CALAMINÆ. *Lond.* CERATUM CARBONATIS ZINCI IMPURI. *Ed.* UNGUENTUM CALAMINÆ. *Dub.* *Cerate of Carbonate of Zinc. Turner's Cerate.*

"Take of Prepared Carbonate of Zinc, Yellow Wax, each, *half a pound;* Lard *two pounds.* Melt the Wax and Lard together, and when upon cooling they begin to thicken, add the Carbonate of Zinc, and stir the mixture constantly until cool." *U.S.*

The *London College* orders half a pound of the carbonate of zinc, half a pound of yellow wax, and a pint of olive oil; the *Edinburgh,* one part of the carbonate and five parts of lard; the *Dublin,* one pound of the carbonate, and five pounds of ointment of yellow wax.

The process adopted in the last edition of our Pharmacopœia is preferable to that of the original edition, in which the proportion of calamine was much too large. This cerate is an imitation of that recommended by Turner. It is mildly astringent, and is much used in excoriations and superficial ulcerations, produced by the chafing of the skin, irritating secretions, burns, or other causes.

W.

CONFECTIONES. *U.S., Lond.*

Confections.

CONSERVÆ; ELECTUARIA. *Ed.* CONFECTIONES; CONSERVÆ; ELECTUARIA. *Dub.*

Under the general title of Confections, the Pharmacopœias of the United States and of London include all those preparations having the form of a soft solid, in which one or more medicinal substances are incorporated with saccharine matter, with a view either to their preservation or more convenient administration. The Edinburgh College retains the old division into Conserves and Electuaries; and, as there is some ground for the distinction, we shall make a few general remarks upon each division, before proceeding to the consideration of the individual preparations.

CONSERVES consist of recent vegetable substances and refined sugar beat into a uniform mass. By means of the sugar, the vegetable matter is enabled to resist for some time the decomposition to which it would otherwise be exposed in the undried state, and the properties of the recent plant are thus retained to a certain extent unaltered. But as active medicines even thus treated undergo some change, and those which lose their virtues by desiccation cannot be long preserved, the few conserves now retained are intended rather as convenient vehicles of other substances, than for separate exhibition. The sugar used in their preparation should be reduced to a fine powder by pounding and sifting, as otherwise it will not mix uniformly with the other ingredient.

ELECTUARIES are mixtures consisting of medicinal substances, especially dry powders, combined with syrup or honey, in order to render them less unpleasant to the taste, and more convenient for internal use. They are usually prepared extemporaneously; and it is only when their complex nature renders it convenient to keep them ready made in the shops, or some peculiarity in the mode of mixing the ingredients requires attention, that they become proper objects for pharmaceutic direction. Their consistence should not be so soft, on the one hand, as to allow the ingredients to separate, nor so firm, on the other, as to prevent them from being swallowed without mastication. Different substances require different proportions of syrup. Light vegetable powders usually require twice their weight, gum-resins two-thirds of their weight, resins somewhat less, mineral substances about half their weight, and deliquescent salts not more than one-tenth. Should the electuary be found, after having been kept for a short time, to swell up and emit gas, it should be beat over again in a mortar, so that any portion of the sugar which may have crystallized may be again accurately incorporated with the other ingredients. Should it on the contrary, become dry and hard, from the mutual reaction of its constituents, more syrup should be added, so as to give it the requisite consistence. If the dryness result from the mere evaporation of the aqueous part, water should be added instead of syrup; and the same remark is applicable to the conserves. To prevent the hardening of electuaries, the French writers recommend the use of syrup prepared from brown sugar, which is less apt to crystallize than that made from the refined. Molasses would answer the same purpose; but its taste might be considered objectionable. Some employ honey, but this is not always acceptable to the stomach. W.

CONFECTIO AMYGDALÆ. *U.S.* CONFECTIO AMYGDALARUM. *Lond., Dub.* *Almond Confection.*

"Take of Almonds [Sweet Almonds, *Lond., Dub.*] *an ounce;* Gum Arabic, in powder, *a drachm;* Sugar [refined] *half an ounce.* Having macerated the Almonds in water, and deprived them of their external coat, beat all the ingredients together till they are thoroughly mixed." *U.S., Lond., Dub.*

This preparation was introduced into the last edition of our Pharmacopœia, from that of London, as affording a speedy method of preparing the almond mixture, which when made immediately from the almonds requires much time, and which cannot be kept ready made in the shops. (See *Mistura Amygdalæ.*) The U.S. Pharmacopœia does not indicate the variety of almonds, whether sweet or bitter. The process will answer equally well for either; but the former should always be employed when the latter are not expressly ordered. W.

CONFECTIO AROMATICA. *U.S., Lond., Dub.* *Aromatic Confection.*

"Take of Aromatic Powder *an ounce;* Syrup of Orange Peel *two ounces.* Beat them together till they are thoroughly mixed." *U.S.*

The process of the *Edinburgh College* is essentially the same.

"Take of Cinnamon Bark, Nutmegs, each, *two ounces;* Cloves *an ounce;* Cardamom Seeds *half an ounce;* Saffron, dried, *two ounces;* Prepared Shells [Prepared Chalk, *Dub.*] *sixteen ounces;* Refined Sugar, in powder, *two pounds;* Water *a pint.* Rub the dry ingredients together to a very fine powder; then add the Water gradually, and mix till they are thoroughly incorporated." *Lond., Dub.*

The preparation of the United States Pharmacopœia contains cinnamon, ginger, and cardamom, without carbonate of lime, which appears to us to be an unnecessary if not improper ingredient, as it is not always indicated in cases which call for the use of the confection, and may be added extemporaneously when required. The aromatic confection affords a convenient method of administering the spices which enter into its composition. It is given in debilitated states of the stomach, alone or as an adjuvant to other medicines. The dose is from ten to sixty grains. W.

CONFECTIO AURANTII CORTICIS. *U.S.* CONFECTIO AURANTIORUM. *Lond.* CONSERVA CITRI AURANTII. *Ed.* *Confection of Orange Peel.*

"Take of Fresh Orange Peel, separated by grating, *a pound;* Sugar [refined] *three pounds.* Beat the Orange Peel with the Sugar gradually added, till they are thoroughly mixed." *U.S.*

The directions of the *London* and *Edinburgh Colleges* correspond with the above. By the London process, the beating is performed in a stone mortar with a wooden pestle.

This confection is sometimes used as a grateful aromatic vehicle or adjunct of tonic and purgative powders. W.

CONFECTIO CASSIÆ. *Lond.* ELECTUARIUM CASSIÆ FISTULÆ. *Ed.* ELECTUARIUM CASSIÆ. *Dub.* *Confection of Cassia.*

"Take of Fresh Cassia Pulp *half a pound;* Manna *two ounces;* Tamarind Pulp *an ounce;* Syrup of roses *half a pint.* Bruise the Manna, and dissolve it in the Syrup by means of a water-bath; then mix in the Pulps, and evaporate to a proper consistence." *Lond.*

The *Edinburgh College* orders four parts of the cassia pulp, one part of tamarind pulp, one part of manna, and four parts of the syrup of pale roses. The formula of the *Dublin College* corresponds with that of the London, except that syrup of orange peel is substituted for the syrup of roses.

The confection of cassia is slightly laxative; but is seldom if ever prepared in this country, and might very properly be expunged from the catalogue of Preparations, as it is both feeble and expensive. W.

ELECTUARIUM CATECHU COMPOSITUM. *Ed., Dub.* *Compound Electuary of Catechu.*

"Take of Extract of Catechu [Catechu] *four ounces;* Kino *three ounces;* Cinnamon Bark, Nutmegs, each, *an ounce;* Opium diffused in a sufficient quantity of Sherry Wine, *a drachm and a half;* Syrup of Red Roses boiled to the consistence of honey, *two pounds and a quarter.* Reduce the solids to powder; and mix them with the Opium and Syrup; so as to form an electuary." *Ed.*

"Take of Catechu *four ounces;* Cinnamon Bark *two ounces;* Kino *three ounces.* Rub these to powder and add of Turkey Opium diffused in Spanish White Wine, *a drachm and a half;* Syrup of Ginger, evaporated to the consistence of honey, *two pounds and a quarter.* Mix them." *Dub.*

These preparations do not essentially differ. They are aromatic and astringent, containing one grain of opium in about two hundred grains of the mass; and may be advantageously given in diarrhœa and chronic dysentery, in the dose of half a drachm or a drachm more or less frequently repeated. They may be taken in the form of bolus, or diffused in water. W.

CONFECTIO OPII. *U.S., Lond., Dub.* ELECTUARIUM OPIATUM *Ed.* *Confection of Opium.*

"Take of Opium, in powder, *six drachms;* Aromatic powder *six ounces;* Tragacanth, in powder, *two drachms;* Syrup *a pint.* Rub the Opium with the Syrup previously heated; then add the other ingredients, and beat the whole together till they are thoroughly mixed." *U.S.*

In the *London* and *Dublin* formulæ, an ounce of long pepper, two ounces of ginger, and three ounces of caraway seeds, all in powder, hold the place of the six ounces of aromatic powder directed by the U.S. Pharmacopœia. In other respects the processes are identical. The *Edinburgh College* directs six ounces of aromatic powder; three ounces of Virginia snake-root in fine powder; half an ounce of opium diffused in a sufficient quantity of sherry wine; and a pound of syrup of ginger.

This confection was intended as a substitute for those exceedingly complex and unscientific preparations which were formerly known by the names of *theriaca* and *mithridate*, and which have been expelled from modern pharmacy. It is a combination of opium with spices, which render it more stimulant, and more grateful to a debilitated stomach. It is given in atonic gout, flatulent colic, diarrhœa unattended with inflammation, and in various other diseases requiring the use of a stimulant narcotic. Added to Peruvian bark or sulphate of quinia it increases considerably the efficacy of this remedy in obstinate cases of intermittent fever. One grain of opium is contained in thirty-six grains of the confection prepared according to the U.S., London, and Dublin processes, and in forty-three grains of the Edinburgh electuary. W.

CONFECTIO PIPERIS NIGRI. *Lond., Dub.* *Confection of Black Pepper.*

"Take of Black Pepper, Elecampane, each, *a pound;* Fennel Seeds *three pounds;* Honey, Refined Sugar, each, *two pounds.* Rub the dry ingredients together into a very fine powder; then add the Honey, and beat the whole into a uniform mass." *Lond., Dub.*

This preparation was intended as a substitute for *Ward's paste*, which acquired some reputation in Great Britain as a remedy in piles. To do good, it must be continued, according to Mr. Brodie, for two, three, or four months. The dose is from one to two drachms repeated two or three times a day. Its stimulating properties render it inapplicable to cases attended with much inflammation. W.

CONFECTIO ROSÆ. *U.S.* CONFECTIO ROSÆ GALLICÆ. *Lond.* CONSERVA ROSÆ GALLICÆ. *Ed.* CONSERVA ROSÆ. *Dub.* *Confection of Roses. Conserve of Roses.*

"Take of Red Roses, unblown, *a pound;* Sugar [refined] *three pounds.* Bruise the Roses; then, gradually adding the Sugar, beat the two together till they are thoroughly mixed." *U.S.*

This process agrees with those of the three British Colleges. The *London College* directs the beating to be performed in a stone mortar. The unblown petals only are used, and these should be deprived of their claws; in other words, the rose buds should be cut off a short distance above their base, and the lower portion rejected.

This confection is slightly astringent, but is almost exclusively used as a vehicle of other medicines, or to impart consistence to the pilular mass.

Off. Prep. Pilulæ Hydrargyri, *U.S., Lond., Ed., Dub.* W.

CONFECTIO ROSÆ CANINÆ. *Lond.* CONSERVA ROSÆ CANINÆ. *Ed.* *Confection of the Dog-rose.*

"Take of Pulp of the Dog-rose *a pound;* Refined Sugar, in powder, *twenty ounces.* Expose the Pulp to a gentle heat by means of a water-bath; then add the Sugar gradually, and rub them together until they are thoroughly mixed." *Lond.*

"Beat the ripe Fruit of the Dog-rose, carefully cleansed from the seeds and down, to a pulp; and, while beating it, add gradually three times its weight of Refined Sugar." *Ed.*

This preparation is acidulous and refrigerant, and is used in Europe for forming more active medicines into pills and electuaries. W.

CONFECTIO RUTÆ. *Lond.* CONSERVA RUTÆ. *Dub.* *Confection of Rue.*

"Take of dried Rue Leaves, Caraway Seeds, Laurel Berries, each, *an ounce and a half;* Sagapenum *half an ounce;* Black Pepper *two drachms;* Clarified Honey *sixteen ounces.* Rub the dry ingredients together to a very fine powder; then add the Honey, and mix the whole together." *Lond.*, *Dub.*

The confection of rue is antispasmodic, and in Great Britain is employed in the form of enema in hysterical complaints and flatulent colic; but in this country it is not used. From a scruple to a drachm may be administered, diffused in half a pint of warm mucilaginous fluid. W.

CONFECTIO SCAMMONII. *U.S.* CONFECTIO SCAMMONEÆ. *Lond.* ELECTUARIUM SCAMMONII. *Dub.* *Confection of Scammony.*

"Take of Scammony, Ginger, each, in powder, *an ounce;* Oil of Cloves *twenty minims;* Syrup of Orange Peel *a sufficient quantity.* Rub together the Scammony and Ginger; then drop in the Syrup, and again rub them; lastly, add the Oil of Cloves, and beat the whole together, till they are thoroughly mixed." *U.S.*

The *London* and *Dublin Colleges* order an ounce and a half of powdered scammony; six drachms of bruised cloves; six drachms of powdered ginger; half a fluidrachm of oil of caraway; and a sufficient quantity of syrup of roses. The dry ingredients are first rubbed together to a very fine powder, then with the syrup gradually added, and lastly with the oil of caraway.

This confection is actively cathartic in the dose of half a drachm or a drachm; but is very little used. The proportion of scammony is uncertain, from the indefinite quantity of syrup employed. W.

CONFECTIO SENNÆ. *U.S.*, *Lond.* ELECTUARIUM SENNÆ COMPOSITUM. *Ed.* ELECTUARIUM SENNÆ. *Dub.* *Confection of Senna.* ELECTUARIUM LENITIVUM. *Lenitive Electuary.*

"Take of Senna *eight ounces;* Coriander [seed] *four ounces;* Liquorice Root, bruised, *three ounces;* Figs *a pound;* Pulp of Prunes, Pulp of Tamarinds, Pulp of Purging Cassia, each, *half a pound;* Sugar [refined] *two pounds and a half;* Water *four pints.* Rub the Senna and Coriander together, and separate ten ounces of the powder with a sieve. Boil the residue with the Figs and Liquorice Root, in the Water, to one half; then press out the liquor and strain it. Evaporate the strained liquor by means of a water-bath to a pint and a half; then add the Sugar and form a syrup. Lastly, rub the Pulps gradually with the syrup, and having thrown in the sifted powder, beat the whole together till they are thoroughly mixed." *U.S.*

The *London* process corresponds with the above. The *Edinburgh College* directs a pound of figs, and omits the cassia pulp. The *Dublin College* boils a pound of the pulp of prunes, and two ounces of the pulp of tamarinds, in a pint and a half of molasses, to the thickness of honey; then adds four ounces of senna in very fine powder, and, when the mixture cools, two drachms of oil of caraway; and, lastly, mixes the whole intimately.

The confection of senna, when properly made, is an elegant preparation. The pulp of purging cassia is most conveniently obtained by boiling the bruised pods in water, straining the decoction, and evaporating to the consistence of an electuary. The pulp of prunes may be prepared by boiling the fruit in a small quantity of water to soften it, then pressing it through a hair sieve, and evaporating to a proper consistence. The tamarinds, when too dry for immediate use, may be treated in the same manner. In each case, the evaporation should be completed by means of a water-bath, in order to prevent the pulps from being burnt. It is common to omit the cassia pulp in the preparation of the confection, as the pods are not always to be found in the market. But as this is next to senna the most active ingredient, the omission is to be regretted; and there is no doubt that a steady demand for the fruit would be met by an abundant supply from the West Indies.

This is one of our best and most pleasant laxatives, being admirably adapted to cases of habitual costiveness, especially in pregnant women and persons affected with piles. It is also very useful in the constipation which is apt to attend convalescence from fevers and other acute diseases. The mean dose is two drachms, to be taken at bed-time. W.

CUPRUM.

Preparations of Copper.

CUPRI ACETAS PRÆPARATUS. *U.S.* CUPRI SUBACETAS PRÆPARATUM. *Dub.* *Prepared Acetate of Copper.*

"Take of Acetate of Copper [verdigris] *any quantity.* Let it be prepared in the manner directed for Carbonate of Lime." *U.S.*

"Let the Subacetate of Copper be ground to powder, and the finer parts separated in the manner directed for the preparation of Chalk." *Dub.*

The object of this process is, by levigation and elutriation, to reduce verdigris to the state of a very fine powder. A chemical change is at the same time produced, which was not originally contemplated. Verdigris is an impure diacetate of copper, consisting of one equivalent of acid, two equiv. of protoxide, and six of water. By the action of water it is converted into the soluble neutral acetate and an insoluble triacetate. The latter, consisting of one equiv. of acetic acid, three equiv. of protoxide of copper, and one and a half of water, is the *Prepared Acetate of Copper* of the Pharmacopœia, which therefore differs from commercial verdigris in composition as well as in its state of aggregation. (See *Cupri Acetas.*) This preparation is used only as an escharotic and stimulant application to unhealthy ulcers and obstinate cutaneous eruptions.

Off. Prep. Oxymel Cupri Subacetatis, *Dub.*; Unguentum Cupri Acetatis, *U.S.*, *Dub.* W.

CUPRUM AMMONIATUM. *U.S.*, *Lond.*, *Dub.* AMMONIARETUM CUPRI. *Ed.* *Ammoniated Copper.*

"Take of Sulphate of Copper *half an ounce;* Carbonate of Ammonia *six drachms.* Rub them together in a glass mortar till the effervescence ceases; then wrap the Ammoniated Copper in bibulous paper, and dry it with a gentle heat. Let it be kept in a well stopped glass bottle." *U.S.*

The processes of the British Colleges are essentially the same as the above, the ingredients, proportions, and general mode of operating being identical. The *London College* omits the direction as to the mode of keeping the preparation; the *Edinburgh* directs that the product, after being wrapped in bibulous paper, should be dried first on a chalk stone, and afterwards by a gentle heat; and the *Dublin* orders the ingredients to be triturated in an earthenware mortar.

When the two salts above mentioned are rubbed together, a reaction takes place between them, attended with the extrication of the water of crystallization of the sulphate of copper, which renders the mass moist, and the simultaneous escape of carbonic acid gas from the carbonate of ammonia, which occasions an effervescence. The colour is at the same time altered, passing from the light blue of the powdered sulphate of copper to a beautiful deep azure. The nature of the chemical changes which take place is not precisely known. The blue vitriol parts with a portion of its acid to the ammonia of the carbonate, thus forming a subsulphate of copper and sulphate of ammonia, which are either mixed together, or, what is more probable, chemically united in the form of a double salt. With this view of its nature, the preparation might be called a sulphate of copper and ammonia, and considered identical with the crystallized salt, obtained by dropping a solution of pure ammonia into a solution of sulphate of copper till the subsalt first thrown down is dissolved, then concentrating, and precipitating by alcohol. But the ammonia of the carbonate employed in the process for preparing the ammoniated copper, is much more than sufficient to saturate the whole of the sulphuric acid of the sulphate of copper; and it is probable, therefore, that there is in the preparation an excess of carbonate of ammonia, which varies according to the temperature employed in drying the medicine. It is not, indeed, impossible, that, as stated by Brande, a carbonate of copper and ammonia may be among its constituents. In this uncertainty as to its precise nature, the name of *ammoniated copper* appears to be as appropriate for a pharmaceutical title as any that could be adopted.

This salt is of a fine blue colour, which on exposure becomes green, in consequence probably of the escape of ammonia. This change is apt to take place to a greater or less extent while it is drying; and it should not, therefore, be prepared in large quantities at a time, and should be carefully excluded from the air. It has the odour of ammonia, and a styptic, metallic taste. It is soluble in water; but, according to Mr. Phillips, is decomposed by this fluid when used in very large proportion. Potassa, lime-water, and the acids are incompatible with it.

Medical Properties and Uses. Ammoniated copper is tonic, and has been much employed in epilepsy, in which it was recommended by Cullen. There is good reason to believe that it has occasionally effected cures; but like all other remedies in that complaint it very frequently fails. It has also been used in chorea, hysteria, and worms; and by Swediaur as an injection in gonorrhœa and leucorrhœa. In over-doses it produces vomiting, and the poisonous effects which result from the other preparations of copper. (See *Cuprum.*) It is said, however, to be less apt to excite nausea. The dose is a quarter or half a grain, repeated twice a day, and gradually increased to four or five grains. It may be given in pill or solution. The medicine should not be very long continued without interruption; according to Cullen, not longer than a month.

Off. Prep. Liquor Cupri Ammoniati, *Lond.*, *Dub.* W.

LIQUOR CUPRI AMMONIATI. *Lond.* CUPRI AMMONIATI AQUA. *Dub.* *Solution of Ammoniated Copper.*

"Take of Ammoniated Copper *a drachm;* Distilled Water *a pint.* Dissolve the Ammoniated Copper in the Water, and filter through paper." *Lond.*

The *Dublin College* employs one part of the salt to one hundred parts of distilled water.

By the quantity of water employed in these processes, the ammoniated copper, unless it contain an excess of carbonate of ammonia, is said by Mr. Phillips to be decomposed, with a precipitation of one-half of the oxide of copper. According to the same author, a smaller portion of water dissolves it perfectly.

This solution is sometimes employed as a stimulant to foul and indolent ulcers, and, diluted with water, as an application to the cornea when affected with specks or opacity; but it is probably in no respect superior for these purposes to the solution of sulphate of copper, and scarcely deserves a place among the officinal preparations. W.

SOLUTIO SULPHATIS CUPRI COMPOSITA. *Ed.* *Compound Solution of Sulphate of Copper.*

"Take of Sulphate of Copper, Alum, each, *three ounces;* Water *two pounds;* Sulphuric Acid *an ounce and a half.* Boil the Sulphates in the Water that they may be dissolved; and then to the liquor filtered through paper add the Acid." *Ed.*

No chemical reaction takes place between the ingredients of this solution, which might with great propriety be left to extemporaneous prescription. It has been used chiefly as a styptic to arrest hemorrhages, being applied to the bleeding surface by means of dossils of lint. It has been employed also in the purulent ophthalmia of infants, largely diluted with water. W.

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DECOCTA.

Decoctions.

Decoctions are solutions of vegetable principles, obtained by boiling the substances containing these principles in water. Vegetables generally yield their soluble ingredients more readily and in larger proportion to water maintained at the point of ebullition, than to the same liquid at a lower temperature. Hence decoction is occasionally preferred to infusion as a mode of extracting the virtues of plants, when the call for the remedy is urgent, and the greatest possible activity in the preparation is desirable. The process should be conducted in a covered vessel, so as to confine the vapour over the surface of the liquid, and thus prevent the access of atmospheric air, which sometimes exerts an injurious agency upon the active principle. The boiling, moreover, should not, as a general rule, be long continued; as the ingredients of the vegetable are apt to react on each other, and thus lose, to a greater or less extent, their original character. The substance submitted to decoction, should if dry be either powdered or well bruised, if fresh should be sliced, so that it may present an extensive surface to the action of the solvent; and previous maceration for some time in water is occasionally useful by overcoming the cohesion of the vegetable fibre.

All vegetable substances are not proper objects for decoction. In many the active principle is volatile at a boiling heat, in others it undergoes some change unfavourable to its activity, and in a third set is associated with inefficient or nauseous principles, which, though insoluble or but slightly soluble in cool water, are abundantly extracted by that liquid at the boiling temperature, and thus encumber, if they do not positively injure the preparation. In all these instances, infusion is preferable to decoction. Besides, by the latter process, more matter is often dissolved than the water can retain in solution, so that upon cooling a precipitation takes place, and the liquid is rendered turbid. When the active principle is thus dissolved in excess, the decoction should always be strained while hot, so that the matter which separates on cooling, may be mixed again with the fluid by agitation at the time of administering the remedy.

In compound decoctions; the ingredients may be advantageously added at different periods of the process, according to the length of boiling requisite for extracting their virtues; and, should any one of them owe its activity to a volatile principle, the proper plan is, at the close of the process, to pour upon it the boiling decoction, and allow the liquor to cool in a covered vessel.

Decoctions, from the mutual reaction of their constituents, as well as from the influence of the air, are apt to spoil in a short time. Hence they should be prepared only when wanted for use, and should not be kept, in warm weather, for a longer period than forty-eight hours. W.

DECOCTUM ALOES COMPOSITUM. *Lond., Dub. Compound Decoction of Aloes.*

"Take of Extract of Liquorice *half an ounce;* Subcarbonate of Potassa *two scruples;* Socotrine Aloes in powder, Myrrh in powder, Saffron, each, *a drachm;* Compound Tincture of Cardamom *four fluidounces;* Water *a pint.* Boil the Liquorice, Subcarbonate of Potassa, Aloes, Myrrh, and Saffron with the Water, to twelve fluidounces; then strain and add the Compound Tincture of Cardamom." *Lond.*

The *Dublin* process differs only in the use of Hepatic instead of Socotrine Aloes.

The effect of the alkaline carbonate is, by combining with the resinous ingredient (apotheme, *Berzelius,*) of the aloes, to render it more soluble in water, while the liquorice assists in the suspension of the portion not actually dissolved. The tincture of cardamom is useful not only by its cordial property, but also by preventing spontaneous decomposition.

Long boiling impairs the purgative property of aloes; and the same effect is thought to be produced, to a certain extent, by the alkalies, which certainly qualify its operation, and render it less apt to irritate the rectum. This decoction, therefore, is milder as a cathartic than aloes itself, and not so liable to produce or aggravate hemorrhoidal disease. At the same time it is more tonic and cordial from the presence of the myrrh, saffron, and cardamom, and derives antacid properties from the carbonate of potassa. It is given as a gentle cathartic, tonic, and emmenagogue; and is especially useful in dyspepsia, habitual constipation, and those complicated cases, in which suppressed or retained menstruation is connected with enfeebled digestion and a languid state of bowels. The dose is from half a fluidounce to two fluidounces.

It should not be combined in prescription with acids, acidulous salts, or other saline bodies which are incompatible with the alkaline carbonate employed in its preparation. W.

DECOCTUM ALTHÆÆ. *Dub.* DECOCTUM ALTHÆÆ OFFICINALIS. *Ed. Decoction of Marsh Mallow.*

"Take of the Herb and Root of Marsh Mallow, dried and bruised, *four ounces;* Raisins, stoned, *two ounces;* Water *seven pints.* Boil down to five pints, and strain the liquor; then set it by till the dregs have subsided, and decant." *Dub.*

The *Edinburgh College* orders the roots only of the marsh mallow, and seven pounds of water.

This decoction is a simple mucilage flavoured with raisins; and may be used advantageously as a drink, in all cases in which demulcents are indicated. W.

DECOCTUM ANTHEMIDIS NOBILIS. *Ed.* DECOCTUM CHAMÆMELI COMPOSITUM. *Dub. Decoction of Chamomile.*

"Take of dried Chamomile Flowers *an ounce;* Caraway Seeds, bruised, *half an ounce;* Water *five pounds.* Boil for a quarter of an hour, and strain." *Ed.*

"Take of dried Chamomile Flowers *half an ounce;* Fennel Seeds *two drachms;* Water *a pint.* Boil for a short time, and strain." *Dub.*

In preparing these decoctions, the aromatic should not be added till near the end of the process. They contain the bitter extractive of the chamomile, with little of its peculiar aroma, which is dissipated by the boiling. They are inferior, therefore, for internal use, to the infusion; and are calculated only for fomentations and enemata. W.

DECOCTUM CINCHONÆ. *U.S., Lond., Dub.* DECOCTUM CINCHONÆ LANCIFOLIÆ. *Ed.* *Decoction of Peruvian Bark.*

"Take of Peruvian Bark, bruised, *an ounce;* Water *a pint.* Boil for ten minutes in a covered vessel, and strain the liquor while hot." *U.S.*

The British Colleges particularize the pale bark as the variety to be employed. The *London* process is identical with ours. The *Edinburgh* differs only in the quantity of water, which is a pound and a half instead of a pint. The *Dublin College*, without specifying the length of boiling, orders an ounce of the bark, in coarse powder, and enough water to yield a pint of the strained decoction.

As the red and yellow barks are certainly not less efficient than the pale, nor less adapted for decoction, we can discover no reason for restricting the process to one variety, and therefore decidedly prefer the American formula, which leaves to the physician the liberty of choice.

The virtues of Peruvian bark, though extracted more rapidly by decoction than by infusion, are materially impaired by long boiling, in consequence of the changes effected in its constituents, either by their mutual reaction, or by the agency of atmospheric oxygen, or by both causes united. To prevent this result, the process is directed to be performed in a covered vessel, and to continue only ten minutes. But even with these precautions a considerable precipitate takes place in the decoction upon cooling, which is thus rendered turbid. According to Pelletier, besides the kinates of cinchonia and quinia, the water dissolves gum, starch, yellow colouring matter, kinate of lime, tannin, and a portion of cinchonic red, with a minute quantity of fatty matter. But the tannin and starch, at the boiling temperature, unite to form a compound insoluble in cold water; and, when the decoction is allowed to cool, this compound is precipitated, together with a portion of the cinchonic red and fatty matter, which carry with them also a considerable quantity of the alkaline principle of the bark. (*Journ. de Pharm.* vii. 119.) Hence the decoction is ordered to be strained while hot, so that the portion of active matter precipitated may be mingled by agitation with the liquor, and not be lost. Pelletier recommends that a larger proportion of water, sufficient to retain the alkali in solution, be employed, that the decoction be filtered when cold, and then sufficiently concentrated by evaporation. But this process would be unnecessarily tedious. A better plan is to add to the liquid some acid which may form with the quinia and cinchonia compounds more soluble than the native salts. Lemon juice has been long employed as a useful addition to the decoction of cinchona, and we can now understand the manner in which it acts. Sulphuric acid in excess answers the same purpose. By acidulating the pint of water employed in preparing the decoction with one fluidrachm of the aromatic or diluted sulphuric acid, we shall probably enable the menstruum to extract all the virtues of the bark. The propriety of such an addition is confirmed by the experiments of *MM.*

Henry Jun. and *Plisson*, who have ascertained that portions of the alkalies exist in the bark connected with the colouring matter in the form of insoluble compounds, and that it is impossible, therefore, completely to exhaust the bark by water alone. There may, however, be some diversity of action between the different salts of quinia and cinchonia; and the native kinates may under certain circumstances be most efficient.

As the bark is never completely exhausted by decoction in the ordinary way, it has been proposed to employ the residue for the extraction of quinia or cinchonia; but this could be done advantageously only in hospitals or great public establishments, where large quantities of the preparation are employed.

Numerous substances produce precipitates with this decoction; but comparatively few affect its activity as a medicine. (See *Infusum Cinchonæ.*) Gallic, oxalic, and tartaric acids, and the substances containing them, should be excluded from the decoction, as they form salts with the alkaline principles of the bark, which are but slightly soluble in water. The alkalies, alkaline earths, and salifiable bases generally, should also be excluded, because, uniting with the kinic acid, they precipitate the quinia and cinchonia.

The dose of the decoction is two fluidounces, to be repeated more or less frequently according to circumstances. Two drachms of orange peel added to the decoction while still boiling hot, improve its flavour, and render it more pleasant to the stomach. W.

DECOCTUM CORNUS FLORIDÆ. *U.S.* *Decoction of Dogwood.*

"Take of Dogwood [bark], bruised, *an ounce;* Water *a pint.* Boil for ten minutes in a covered vessel, and strain the liquor while hot." *U.S.*

This decoction has been proposed as a substitute for that of Peruvian bark; but, though possessed of analogous properties, it is much inferior in efficacy, and is not likely to be extensively employed so long as the Peruvian tonic is attainable. The dose is two fluidounces. W.

DECOCTUM CYDONIÆ. *Lond.* *Decoction of Quince Seeds.*

"Take of Quince Seeds *two drachms;* Water *a pint.* Boil over a slow fire for ten minutes; then strain." *Lond.*

This decoction is viscid, nearly colourless, insipid, and inodorous; and consists chiefly of the mucilaginous principle of the quince seeds dissolved in water. For an account of the properties and uses of this mucilage see *Cydoniæ Semina.* The decoction speedily undergoes decomposition, and should, therefore, be used immediately after being prepared. W.

DECOCTUM DULCAMARÆ. *U.S., Lond., Dub.* *Decoction of Bittersweet.*

"Take of Bittersweet, bruised, *an ounce;* Water *a pint and a half;* Boil down to a pint and strain." *U.S.*

The processes of the British Colleges correspond with the above.

The slender twigs of the bittersweet are the part employed. Their properties and uses have been already detailed under the head of Dulcamara. The dose of the decoction is from one to two fluidounces three or four times a day. W.

DECOCTUM GEOFFROYÆ. *Dub.* DECOCTUM GEOFFRÆÆ INERMIS. *Ed.* *Decoction of Cabbage-tree Bark.*

"Take of Cabbage-tree Bark, bruised, *an ounce;* Water *two pints.* Boil down to a pint, and to the strained liquor add *two ounces* of the Syrup of Orange Peel." *Dub.*

"Take of Cabbage-tree Bark, in powder, *an ounce;* Water *two pounds.* Boil with a gentle fire down to one pound, and strain." *Ed.*

This decoction has the colour of Madeira wine. It is powerfully anthelmintic, and is a popular remedy in the West Indies. The disagreeable effects which are said to arise from an over-dose, or from drinking cold water during its operation, may be counteracted, according to Dr. Wright, by washing out the stomach with warm water, purging with castor oil, and administering lemonade freely. The dose for an adult is two fluidounces, for a child two or three years old, half a fluidounce, to be gradually increased at each successive administration till it produces nausea. W.

DECOCTUM GLYCYRRHIZÆ. *Dub. Decoction of Liquorice Root.*

"Take of Liquorice Root, bruised, *an ounce and a half;* Water *a pint.* Boil for ten minutes, and strain." *Dub.*

This decoction may be used as a demulcent beverage, or as a vehicle for medicines of unpleasant flavour. W.

DECOCTUM GUAIACI COMPOSITUM. *Ed., Dub. Compound Decoction of Guaiacum Wood.*

"Take of Guaiacum Wood, rasped, *three ounces;* Raisins *two ounces;* Sassafras Root, sliced, Liquorice Root, bruised, each, *an ounce;* Water *ten pounds.* Boil the Guaiacum Wood and Raisins with the Water down to five pounds, adding, towards the end of the process, the Sassafras and Liquorice Root; then strain." *Ed.*

"Take of Guaiacum Wood, rasped, *three ounces;* Sassafras Root, sliced, *ten drachms;* Liquorice Root, bruised, *two ounces and a half;* Water *ten pints.* Boil the Guaiacum Wood in the Water down to one half; near the end of the boiling add the Liquorice and Sassafras, and strain the liquor." *Dub.*

This is the old *decoction of the woods.* Notwithstanding its former reputation, it is little more than a demulcent drink; for water is capable of dissolving but a minute proportion of the active matter of guaiacum wood, and one ounce of sassafras root can impart no appreciable activity to five pints of menstruum. It was thought useful in chronic rheumatism and cutaneous affections, and as an adjuvant to a mercurial course in syphilis, or an alterative course of antimonials. As the patient was directed to be kept warm during its use, it no doubt acted favourably in some instances as a mere diluent, by promoting perspiration. From one to two pints may be taken in the course of the day, in doses of about four fluidounces. W.

DECOCTUM HÆMATOXYLI. *U.S. Decoction of Logwood.*

"Take of Logwood, rasped, *an ounce;* Water *two pints.* Boil down to a pint, and strain." *U.S.*

This is an excellent astringent in diarrhœa, particularly in that form of it which succeeds the cholera infantum of this climate, or occurs as an original complaint in children during summer. The dose for an adult is two fluidounces, for a child about two years old, two fluidrachms, repeated several times a day. A little bruised cinnamon may often be added with advantage at the end of the boiling. W.

DECOCTUM HORDEI. *U.S., Lond., Dub.* DECOCTUM HORDEI DISTICHI. *Ed. Decoction of Barley.*

"Take of [Pearl] Barley *two ounces;* Water *four pints and a half.* First wash away, with cold water, the extraneous matters which adhere to the Barley; then pour upon it half a pint of the Water, and boil for a short time. Having thrown away this water, pour the remainder boiling hot upon the Barley; then boil down to two pints, and strain." *U.S.*, *Lond.*

The processes of the *Edinburgh* and *Dublin Colleges* do not essentially differ from the above.

Barley water, as this decoction is usually called, is much employed as a nutritive drink in febrile and inflammatory complaints, and, from the total absence of irritating properties, is peculiarly adapted to cases in which the gastric or intestinal mucous membrane is inflamed. As the stomach of those for whom it is directed is often exceedingly delicate, and apt to revolt against any thing having the slightest unpleasantness of flavour, it is important that the decoction should be properly made; and though the office of preparing it generally falls to nurses, yet the introduction of the process into the Pharmacopœia is not without advantage, as a formula is thus ever before the physician, by which he may give his directions, with the certainty, if obeyed, of having a good preparation. The use of the washing with cold water, and of the first short boiling, is completely to remove any mustiness, or other disagreeable flavour, which the barley may have acquired from exposure.

W.

DECOCTUM HORDEI COMPOSITUM. *Lond.*, *Dub.* *Compound Decoction of Barley.*

"Take of Decoction of Barley *two pints;* Figs, sliced, *two ounces;* Liquorice Root, sliced and bruised, *half an ounce;* Raisins, stoned, *two ounces;* Water *a pint.* Boil down to two pints, and strain." *Lond.*

"Take of Decoction of Barley *four pints;* Raisins, stoned, Figs, sliced, each, *two ounces;* Liquorice Root, sliced and bruised, *half an ounce.* During the boiling, add first the Raisins, then the Figs, and lastly the Liquorice Root a short time before it is finished, when the strained decoction ought to measure two pints." *Dub.*

We prefer the London process, as it preserves the original strength of the simple decoction, which, according to the Dublin process, is, without any good reason that we can discover, concentrated to one half of its former bulk by evaporation. The compound decoction, in addition to the demulcent and nutritive properties of the simple, is somewhat laxative, and may be preferably employed where there is a tendency to constipation. But it is so often necessary to vary the nature of the sapid ingredients to suit the taste of the patient, that it would be better to leave the preparation entirely to extemporaneous prescription; and the process has been accordingly omitted in the last edition of the U.S. Pharmacopœia. W.

DECOCTUM LICHENIS. *U.S.*, *Lond.* DECOCTUM LICHENIS ISLANDICI. *Ed.*, *Dub.* *Decoction of Iceland Moss.*

"Take of Iceland Moss *an ounce;* Water *a pint and a half.* Boil down to a pint, and strain with compression." *U.S.*

The process of the *London College* corresponds with ours. The *Edinburgh College* orders an ounce of the moss with two pounds of water to be boiled to sixteen ounces, and strained. By the *Dublin* process, half an ounce of the moss is digested for two hours in a close vessel with a pint of boiling water, then boiled for fifteen minutes, and the liquor strained while hot.

As the bitter principle is dissolved along with the starch of the lichen, this decoction unites an unpleasant flavour to its demulcent properties; but the plan which has been proposed of first extracting the bitterness by maceration in water, or a very weak solution of an alkaline carbonate, and afterwards preparing the decoction, is inadmissible; as the peculiar virtues which distinguish the medicine from the ordinary demulcents are thus entirely lost. (See *Lichen.*) A pint of the decoction may be taken in divided doses during the twenty-four hours. W.

DECOCTUM MALVÆ COMPOSITUM. *Lond.* *Compound Decoction of Mallows.*

"Take of dried Mallows *an ounce;* dried Chamomile Flowers *half an ounce;* Water *a pint.* Boil for a quarter of an hour, and strain." *Lond.*

This is intended only for fomentations and enemata. W.

DECOCTUM MEZEREI. *Dub.* DECOCTUM DAPHNES MEZEREI. *Ed.* *Decoction of Mezereon.*

"Take of Bark of Mezereon Root *two drachms;* Liquorice Root, bruised, *half an ounce;* Water *three pounds.* Boil with a gentle fire down to two pounds, and strain." *Ed.*

The *Dublin* process is essentially the same.

This preparation affords a convenient mode of exhibiting mezereon, the acrimony of which is qualified by the demulcent principles of the liquorice root. For an account of its medical application, see *Mezereum.* The dose is from four to eight fluidounces four times a day. W.

DECOCTUM PAPAVERIS. *Lond., Dub.* *Decoction of Poppy.*

"Take of White Poppy Capsules, sliced, *four ounces;* Water *four pints* [two pints, *Dub.*]. Boil for a quarter of an hour, and strain." *Lond.*

This decoction is used as an anodyne fomentation in painful tumours and superficial cutaneous inflammation or excoriation. It is recommended not to reject the seeds, as their oil, suspended in the water by the mucilage of the capsules, adds to the emollient virtues of the preparation. W.

DECOCTUM PYROLÆ. *Dub.* *Decoction of Pipsissewa or Winter Green.*

"Take of Pipsissewa *an ounce;* Water *two pints.* Macerate for six hours; then take out the Pipsissewa, and having bruised it, return it to the liquor, and evaporate until only enough remains to afford one pint of decoction strained with expression." *Dub.*

The pipsissewa, or winter green, has been introduced into the U.S. Pharmacopœia by the name of *Chimaphila,* which is now the recognised generic title of the plant. Under this head, in the Materia Medica, the reader will find an account of the uses of the medicine. In this country it is almost always possible to obtain the fresh leaves, with which the decoction may be prepared without the previous maceration, directed by the Dublin College. One pint may be taken in the course of twenty-four hours. W.

DECOCTUM QUERCUS. *Lond., Dub.* DECOCTUM QUERCUS ROBORIS. *Ed.* *Decoction of Oak Bark.*

"Take of Oak Bark *an ounce;* Water *two pints.* Boil down to a pint, and strain." *Lond., Dub.*

The *Edinburgh College* directs two pounds and a half of water, and boils to sixteen ounces.

This decoction contains the tannin, extractive, and gallic acid of oak bark. It affords precipitates with the decoction of Peruvian Bark, solution of gelatin, and with most metallic salts, particularly those of iron. Alkaline solutions diminish or destroy its astringency. Its uses have been already detailed. The dose is a wineglassful, frequently repeated. W.

DECOCTUM SARSAPARILLÆ. *U.S., Lond., Dub.* DECOCTUM SMILACIS SARSAPARILLÆ. *Ed.* *Decoction of Sarsaparilla.*

"Take of Sarsaparilla, sliced and bruised, *six ounces;* Water *six pints.* Boil down to four pints, and strain." *U.S.*

"Take of Sarsaparilla Root, sliced, *four ounces;* Boiling Water *four pints.* Macerate for four hours in a covered vessel, near the fire; then take out the Sarsaparilla and bruise it. Put it again into the liquor, and macerate it in the same manner for two hours more; then boil down to two pints, and strain." *Lond.*

The *Dublin* process differs from that of the London College only in the omission of the second maceration.

"Take of the Root of Sarsaparilla, sliced, *six ounces;* Water *eight pounds.* Digest for two hours with a heat of about 195°; then take out the Root, and having bruised it, return it to the liquor, boil down to four pounds, express and strain the decoction." *Ed.*

Of these processes we decidedly prefer that of the U.S. Pharmacopœia, both for its greater simplicity, and for the shorter continuance of the boiling. There can be no occasion for the maceration directed by the British Colleges; as, if the root is sliced and well bruised, all its ingredients that are soluble in water may be extracted by a length of boiling sufficient to reduce the liquor to one-half. An idea was formerly entertained that the virtues of sarsaparilla resided in its fecula, the extraction of which was, therefore, the main object of the decoction. Hence the long boiling ordered by the Colleges. But this opinion is now admitted to be erroneous. The activity of the root is believed to depend upon one or more acrid principles, soluble to a certain extent in water cold or hot, and either volatilized, or rendered inert by chemical change, at the temperature of 212°. This fact appears to be demonstrated by the experiments of Pope,* Hancock,† Soubeiran,‡ and others. Hancock makes the following observations. "After long boiling, the peculiar odour which rises abundantly on the coction of good *sarsa*, is almost extinguished. From the sarsa prepared in this way I found no sensible results upon any patient, nor were its peculiar nauseating, drowsy, and racking effects produced by a large quantity, although the decoction of six or eight ounces was tried at a dose. These experiments having been carried to a sufficient length, most of the same patients recovered under the use of the sarsa, taken from the same parcels as before, but now prepared by simple maceration in hot water, *i.e.* affused in a boiling state, and kept near the boiling state for some hours. In all cases the sarsa was directed to be well bruised in large mortars, and in the mean time all other remedies were abstained from, which might, in any way, affect the result." M. Soubeiran macerated one portion of bruised sarsaparilla in cold water for twenty-four hours; infused another portion in boiling water, and digested with a moderate heat for two hours: boiled a third portion bruised, and a fourth unbruised, in water for two hours; and in each instance used the same relative quantities. Testing these various preparations by the taste, he found the cold and hot infusion scarcely different in this respect; and both possessed of a stronger odour and more acrid taste than the decoctions, of which that prepared with the bruised root was the strongest. From all these facts the inference is obvious, that the best method of imparting the virtues of sarsaparilla to water, is either by cold or hot infusion. Digestion for some hours in water maintained at a temperature of 180° or somewhat less, in a covered vessel, has the greatest weight of testimony in its favour. Decoction is the worst method; and the longer it is continued the weaker will be the preparation. The process of the U.S. Pharmacopœia, which reduces the liquor only one-third by boiling, is therefore superior to those of the British Colleges, which reduce it one-half. It is probable that, as in the case of the Peruvian bark, a boiling of ten or fifteen minutes might be advantageously resorted to, when circumstances require the preparation to be made in less time than is requisite for infusion. In every instance the root should be thoroughly bruised, or reduced to a coarse powder, thus obviating the necessity for a long maceration, merely to overcome the cohesion of its fibres.

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* Trans. of the Medico-Chirurg. Society of Lond. vol. xii. p. 344.

† Trans. of the Medico-Botan. Society of Lond. See also Journ. of the Phil. Col. of Pharm. vol. i. p. 295. The observations of Dr. Hancock are entitled to much credit, as he practised long in South America, in the neighbourhood of the best sarsaparilla regions.

‡ Journ. de Pharmacie, tom. xvi. p. 38.

Precipitates are produced by various substances with the decoction of sarsaparilla; but it has not been ascertained how far such substances interfere with its activity. Those which merely throw down the fecula do not injure the preparation.

The simple decoction of sarsaparilla is chiefly used in the preparation of the compound decoction. If given alone, it may be administered in the dose of four or six fluidounces four times a day. W.

DECOCTUM SARSAPARILLÆ COMPOSITUM. *U.S.*, *Lond.*, *Dub.* *Compound Decoction of Sarsaparilla.*

"Take of Decoction of Sarsaparilla, boiling hot, *four pints;* Bark of Sassafras Root, sliced, Guaiacum Wood, rasped, Liquorice Root, bruised, each, *an ounce;* Mezereon, sliced, *three drachms.* Boil for a quarter of an hour, and strain." *U.S.*

The *London* and *Dublin* processes are the same with the above, except that sassafras root is directed instead of the bark of the root.

This decoction is an imitation of the celebrated *Lisbon diet drink.* The sarsaparilla and mezereon are the active ingredients; the guaiacum wood imparting scarcely any of its virtues; and the sassafras and liquorice serving little other purpose than to communicate a pleasant flavour.

A better plan of preparing this decoction, is to substitute for the four pints of decoction of sarsaparilla, six ounces of the root itself, thoroughly bruised or coarsely powdered, and four pints of water; and to allow the ingredients, after the completion of the boiling, to remain in a covered vessel in a warm place for two or three hours before straining. The boiling of fifteen minutes, and the subsequent maceration, would probably be sufficient to extract all the virtues of the sarsaparilla, which water alone, in the proportion indicated, is capable of taking up.

If prepared with good sarsaparilla, and with a due regard to the practical rules which may now be considered as established, this decoction may be used with great advantage as a gentle diaphoretic and alterative in secondary syphilis, either alone, or as an adjuvant to a mercurial course; also in certain scrofulous and other depraved conditions of the system, in chronic rheumatism, and in various obstinate cutaneous affections. The dose is from four to six fluidounces three or four times a day. The patient during its use should wear flannel next the skin, and avoid unnecessary exposure to changes of temperature. W.

DECOCTUM SENEGÆ. *U.S.*, *Lond.*, *Dub.* DECOCTUM POLYGALÆ SENEGÆ. *Ed.* *Decoction of Seneka.*

"Take of Seneka, bruised, *an ounce;* Water *two pints.* Boil down to a pint, and strain." *U.S.*, *Lond.*

The *Edinburgh College* directs two pounds of water, to be boiled down, with an ounce of Seneka, to sixteen ounces; the *Dublin*, a pint and a half of water, with three drachms of the root, to eight ounces.

It is customary to add to the seneka an equal weight of liquorice root, which serves to cover its taste, and in some measure to obtund its acrimony. The virtues and practical application of seneka have been already treated of. The dose of the decoction is about two fluidounces three or four times a day. W.

DECOCTUM TARAXACI. *Dub.* *Decoction of Dandelion.*

"Take of the Fresh Herb and Root of Dandelion *four ounces;* Water *two pints.* Boil down to a pint, and strain the expressed liquor." *Dub.*

This decoction would be more efficient if prepared from the root alone. The dose is a wineglassful two or three times a day. (See *Taraxacum.*) W.

DECOCTUM ULMI. *Lond., Dub.* DECOCTUM ULMI CAMPESTRIS. *Ed.* *Decoction of Elm Bark.*

"Take of Fresh Elm Bark, bruised, *four ounces;* Water *four pints.* Boil down to two pints, and strain." *Lond.*

The *Edinburgh College* orders four ounces of the bark and five pounds of water to be reduced by boiling to two pounds and a half. The *Dublin* process corresponds in its proportions with the London.

This decoction, being prepared from the bark of the European elm, is not used in this country. It had some repute in England as a remedy for certain cutaneous disorders; but has fallen into discredit. From four to six fluidounces were given two or three times a day. W.

DECOCTUM UVÆ URSI. *U.S.* *Decoction of Uva Ursi.*

"Take of Uva Ursi *an ounce;* Water *twenty fluidounces.* Boil down to a pint, and strain." *U.S.*

This decoction contains the tannin, extractive, and gallic acid of the leaves. For an account of its uses see *Uva Ursi.* The dose is from one to two fluidounces three or four times a day. W.

DECOCTUM VERATRI ALBI. *U.S.* DECOCTUM VERATRI. *Lond., Dub.* *Decoction of White Hellebore.*

"Take of White Hellebore, in powder, *an ounce;* Water *two pints;* Alcohol *two fluidounces.* Pour the Water upon the Hellebore and boil down to a pint; then strain the decoction, and after it has cooled add the Alcohol." *U.S.*

The *London* and *Dublin* processes correspond with the above.

The root of the white hellebore imparts its acrid properties to boiling water, and the decoction is powerfully cathartic and emetic; but, in consequence of the harshness of its action, it is not used internally. As an external application it is employed in psora, tinea capitis, lepra, and other cutaneous eruptions, in which it sometimes proves highly beneficial. When the skin is very irritable, it should be diluted with an equal measure of water. Even externally applied it should be used with some caution; as the veratria, upon which its activity depends, may possibly be absorbed. As the plant is not a native of this country, the *Veratrum viride*, which is identical in medical properties, may be advantageously substituted for it in the preparation of the decoction. W.

EMPLASTRA.

Plasters.

Plasters are solid compounds intended for external application, adhesive at the temperature of the human body, and of such a consistence as to render the aid of heat necessary in spreading them. Most of them have as their basis a compound of olive oil and litharge, constituting the Emplastrum Plumbi of the United States Pharmacopœia; and it has been proposed by M. Deyeux to restrict the term plaster to those bodies which are formed by the mutual reaction of the metallic oxides and oil or fat. But this proposition has not been adopted; and as the object of nomenclature is practical utility, there is an obvious propriety in retaining under the same officinal title, substances which, though differing in composition, are closely allied in all that relates to their pharmaceutic management. Those plasters which contain none of the compound of oil and litharge, owe their consistence and adhesiveness to resinous substances, or to a mixture of these with wax and oleaginous matter. Only two of this class have gained admission into our national Pharmacopœia; several of those directed by the British Colleges having been rejected as superfluous, and the Emplastrum Cantharidis transferred to the Cerates, to which class it properly belongs.

In the preparation of the plasters, care is requisite that the heat employed be not sufficiently elevated to produce decomposition, nor so long continued as to drive off any volatile ingredient upon which the virtues of the preparation may in a greater or less degree depend. After having been prepared, they are usually shaped into cylindrical rolls, and wrapped in paper to exclude the air. Plasters should be firm at ordinary temperatures, should spread easily when heated, and after being spread, should remain soft, pliable, and adhesive, without melting at the heat of the human body. When long kept, they are apt to change colour and to become hard and brittle; and as this alteration is most observable upon their surface, it must depend chiefly upon the action of the air, which should therefore be as much as possible excluded. The defect may usually be remedied by melting the plaster with a moderate heat, and adding a sufficient quantity of oil to give it the due consistence.

Plasters are prepared for use by spreading them upon leather, linen, or muslin, according to the particular purposes they are intended to answer. Leather is most convenient when the application is made to the sound skin, linen or muslin when the plaster is used as a dressing to ulcerated or abraded surfaces, or with the view of bringing and retaining together the sides of wounds. The leather usually preferred is white sheep skin. A margin about a quarter or half an inch broad should usually be left uncovered, in order to facilitate the removal of the plaster, and to prevent the clothing in contact with its edges from being soiled. An accurate outline may be obtained by pasting upon the leather a piece of paper, so cut as to leave in the centre a vacant space of the required dimensions, and removing the paper when no longer required. The same object may be accomplished by employing two narrow rulers of sheet tin, graduated in inches, and so shaped that each of them may form two sides of a rectangle. (See the figure, p. 699.) These may be applied in such a manner as to enclose within them any given rectangular space, and may be fixed by weights upon the leather while the plaster is spread. For any other shape, as in the instance of plasters for the breast, pieces of tin may be employed having a vacuity within, corresponding to the required outline. The spreading of the plaster is most conveniently accomplished by means of a peculiar iron instrument employed for the purpose; though a common spatula will answer. This may be heated by means of a spirit lamp. A sufficient portion of the plaster should first be melted by the heated instrument, and having been received on a piece of coarse stiff paper, should, when nearly cool, be transferred to the leather, and applied evenly over its extended surface. By this plan the melted plaster is prevented from penetrating the leather, as it is apt to do when applied too hot. When linen or muslin is used, and the dimensions of the portion to be spread are large, as is often the case with adhesive plaster, the best plan is to pass the cloth "on which the plaster has been laid, through a machine formed of a spatula fixed by screws, at a proper distance from a plate of polished steel." W.

EMPLASTRUM AMMONIACI. *U.S. Lond., Ed., Dub. Ammoniac Plaster.*

Take of Ammoniac *five ounces;* Vinegar *half a pint.* Dissolve the Ammoniac in the Vinegar, and strain; then evaporate the solution in an iron vessel, by means of a water-bath, stirring constantly until it acquires a proper consistence." *U.S.*

The *London* and *Edinburgh Colleges* direct purified ammoniac and distilled vinegar, and omit the straining of the acetic solution. In other respects their processes are the same with ours, except that the Edinburgh College orders five parts of the gum-resin to eight parts of the solvent, instead of five ounces to half a pint. In the *Dublin* process, the ingredients are in the same proportion as in that of the U. S. Pharmacopœia; but pure ammoniac is directed, the vinegar of squill is substituted for common vinegar, the straining is omitted, and the evaporation is conducted without the water-bath.

As ammoniac is not usually kept purified in our shops, the straining of the solution in vinegar is directed as the most convenient method of separating impurities. Dr. Duncan says that the plaster, prepared in iron vessels, as ordered in all the Pharmacopœias, except that of Dublin, "acquires an unpleasant dark colour, from being impregnated with iron; whereas, when prepared in a glass or earthenware vessel, it has a yellowish-white colour, and more pleasant appearance."

Medical Properties. The ammoniac plaster is stimulant, and is applied over scrofulous tumours, and swellings of the joints, to promote their resolution. It often produces a papular eruption, and sometimes occasions considerable inflammation of the skin. Dr. Duncan has described a fatal case of diffuse inflammation following its use in a case of diseased knee joint. W.

EMPLASTRUM AMMONIACI CUM HYDRARGYRO. *Lond., Dub. Plaster of Ammoniac with Mercury.*

"Take of purified Ammoniac *a pound;* Purified Mercury *three ounces;* Sulphurated oil *a fluidrachm.* Rub the Mercury with the sulphurated Oil until the globules disappear; then gradually add the Ammoniac previously melted, and mix the whole together." *Lond.*

"Take of Pure Gum Ammoniac *a pound;* Purified Mercury *three ounces;* Common Turpentine *two drachms.* Rub the Mercury with the Turpentine ntil the globules disappear, then gradually add the Ammoniac previously elted, and with a moderate heat rub them all together till they unite." *Dub.*

Of these processes the latter is preferable, as the unpleasant odour of the lphurated oil is avoided, as well as the action of the sulphur upon the mercury, with which it must form an inactive sulphuret. But it should be recollected that the common turpentine of Great Britain is not the common white turpentine of our shops. The former is a thick liquid, the latter a soft solid. If the white turpentine be employed, it should be rendered sufficiently liquid by the admixture of Venice turpentine. As ammoniac is not fusible by heat, it must be brought to the proper consistence by dissolving it in a small quantity of hot water, straining, and evaporating.

Medical Properties and Uses. This plaster unites with the stimulant power of the ammoniac the specific properties of the mercury, which is sometimes absorbed in sufficient quantity to affect the gums. It is used as a discutient in enlargement of the glands, tumefaction of the joints, nodes and other indolent swellings, especially when dependent on a venereal taint. It is sometimes, also, applied over the region of the liver in chronic hepatitis. W.

EMPLASTRUM AROMATICUM. *Dub.* *Aromatic Plaster.*

"Take of Frankincense [concrete juice of the Pinus Abies] *three ounces;* Yellow Wax *half an ounce;* Cinnamon Bark, in powder, *six drachms;* Oil of Pimento, Oil of Lemons, each, *two drachms.* Melt the Frankincense and Wax together, and strain. When, upon cooling, they begin to thicken, mix in the powdered Cinnamon previously rubbed with the oils, and make a plaster." *Dub.*

As the virtues of this plaster depend chiefly upon volatile ingredients, it cannot be kept long without injury, and should therefore be extemporaneously prepared. It is not intended to be very adhesive, as, in order to maintain the due impression, its application must be frequently renewed. The volatility of the oils requires that it should be spread without being melted or heated more than is absolutely necessary to produce the proper degree of softness. We are therefore recommended to spread it with the fingers.

Medical Properties and Uses. This is an elegant local stimulant, calculated when applied over the region of the stomach to allay nausea and vomiting, to correct flatulence, and to relieve the gastric uneasiness attendant upon dyspepsia. W.

EMPLASTRUM ASSAFŒTIDÆ. *U.S.* EMPLASTRUM ASSAFŒTIDÆ. *Ed.* *Assafetida Plaster.*

"Take of Assafetida, Lead Plaster, each, *a pound* [two parts, *Ed.*]; Galbanum, Yellow Wax, each, *half a pound* [one part, *Ed.*]. Melt together the Plaster and Wax; then add the Assafetida and Galbanum, previously melted and strained, and mix the whole together." *U.S.*

In the first edition of the U.S. Pharmacopœia, the ingredients of this plaster were simply directed to be melted together, and mixed; but experience has shown that they cannot, in this mode, be made to combine properly; and the directions of the Edinburgh College were therefore substituted in the revised edition. Even as the process now stands, it requires some explanation. The galbanum melts sufficiently by the aid of heat to admit of being strained; but this is not the case with the assafetida, which must be prepared by dissolving it in a small quantity of hot water, straining, and evaporating to the consistence of honey; and even the galbanum may be most conveniently treated in the same way. The assafetida may also be brought to the proper consistence by dissolving it in diluted alcohol in the proportion of half a pound to a pint, and evaporating by means of a water-bath.

This plaster may be advantageously applied over the stomach or abdomen, in cases of hysteria attended with flatulence, and to the chest or between the shoulders in hooping cough. W.

EMPLASTRUM BELLADONNÆ. *Dub.* *Plaster of Deadly Nightshade.*

"Take of the Inspissated Juice of the Deadly Nightshade [Extractum Belladonnæ] *an ounce;* Soap Plaster *two ounces.* Make a plaster." *Dub.*

The most convenient method of forming this plaster, is to rub the ingredients together in an earthenware mortar placed in hot water, and then, having removed the mortar from the water-bath, to continue the trituration till the mixture cools. The preparation was introduced into the Dublin Pharmacopœia, as a useful anodyne application in neuralgic and rheumatic pains; and from our own experience we can bear testimony to its beneficial operation in some of these cases. We have seen the constitutional effects of belladonna result from the external use of this plaster. W.

EMPLASTRUM CANTHARIDIS. *Lond.*, *Dub.* EMPLASTRUM CANTHARIDIS VESICATORIÆ. *Ed.* *Plaster of Spanish Flies.* See CERATUM CANTHARIDIS. *U. S.*

EMPLASTRUM CANTHARIDIS VESICATORIÆ COMPOSITUM. *Ed.* *Compound Plaster of Spanish Flies.*

"Take of Venice Turpentine *eighteen parts;* Burgundy Pitch, Spanish Flies, each, *twelve parts;* Yellow Wax *four parts;* Sub-Acetate of Copper *two parts;* White Mustard Seeds, Black Pepper, each *one part.* Having first melted the Pitch and Wax, add the Turpentine; and to these, still hot, add the other ingredients previously reduced to a fine powder and mixed, and stir the whole together till the mixture stiffens on cooling." *Ed.*

This is intended to be a powerful and speedy blistering plaster, and may probably prove beneficial in very urgent cases attended with much torpor of the skin; but great care should be observed not to allow it to remain too long, as unpleasant and tedious ulceration, if not gangrene, might result. To the cases of children it is wholly inapplicable. W.

EMPLASTRUM CERÆ. *Lond.* EMPLASTRUM SIMPLEX. *Ed.* *Wax Plaster.*

"Take of Yellow Wax, Prepared Suet, each, *three pounds;* Yellow Resin *a pound.* Melt them together and strain." *Lond.*

"Take of Yellow Wax *three parts;* Mutton Suet, Pine Resin, each, *two parts.* Melt them together with a gentle heat, and stir the mixture well till it stiffens on cooling." *Ed.*

These plasters were originally intended for dressing blistered surfaces, in order to maintain a moderate discharge, for which purpose they are adapted by the stimulant properties of the resin. But their stiffness and adhesiveness render them unpleasant and of difficult management; and they have been entirely superseded by the resin cerate.

Off. Prep. Emplastrum Cantharidis, *Lond.* W.

EMPLASTRUM CUMINI. *Lond.* *Cumin Plaster.*

"Take of Cumin Seeds, Caraway Seeds, Bay Berries [Lauri Baccæ], each, *three ounces;* Burgundy Pitch *three pounds;* Yellow Wax *three ounces;* Olive Oil, Water, each *a fluidounce and a half.* To the Pitch and Wax melted together, add the dry ingredients previously powdered, the Olive Oil, and the Water; then boil to a proper consistence." *Lond.*

This is a warm, moderately stimulant plaster, occasionally useful in the discussion of indolent tumours, and, when applied over the abdomen, in the relief of flatulence and other symptoms dependent upon a sluggish or debilitated condition of the stomach and bowels. W.

EMPLASTRUM FERRI. *U. S.* EMPLASTRUM OXIDI FERRI RUBRI. *Ed.* EMPLASTRUM THURIS. *Dub.* EMPLASTRUM ROBORANS. *Iron Plaster. Strengthening Plaster.*

"Take of Red Oxide of Iron *eight ounces;* Lead Plaster *two pounds;* Resin *six ounces;* Yellow Wax, Olive Oil, each, *three ounces.* Rub the Red Oxide of Iron with the Oil; then add the other ingredients previously melted together by means of a water-bath, and mix the whole." *U.S.*

The process of the *Edinburgh College* corresponds with the above in the proportions of the ingredients, and the general mode of proceeding.

The *Dublin College* directs that two pounds of litharge plaster (Emplastrum Plumbi) be melted with half a pound of frankincense (concrete juice of the *Pinus Abies*); that three ounces of the red oxide of iron be afterwards added; and the whole stirred together, so as to form a plaster.

This preparation has enjoyed some popular celebrity, under the impression that it strengthens the parts to which it is applied; whence it has derived the name of strengthening plaster. It is used in those conditions of the loins, larger muscles, and joints, which, though usually ascribed to debility, are in fact most frequently dependent on rheumatic or other chronic inflammatory affections, and, if relieved by the plaster, are so in consequence of the gentle excitation which it produces in the vessels of the skin. It may also, in some instances, give relief by affording mechanical support; but neither in this, nor in any other respect, can it be deemed very efficient. Prepared according to the U. S. and Edinburgh process, it is deficient in the qualities which characterize a good plaster, and among others that of adhesiveness. We should prefer the process of the Dublin Pharmacopœia, Burgundy pitch being substituted for frankincense. W.

EMPLASTRUM GALBANI. *Dub.* *Galbanum Plaster.*

"Take of Litharge Plaster [Emplastrum Plumbi] *two pounds*; Galbanum *half a pound*; Yellow Wax, sliced, *four ounces.* Add the Litharge Plaster and Wax to the Galbanum previously melted; then melt the whole together with a moderate heat, and strain." *Dub.*

This is essentially the same in properties as the following, though somewhat less stimulating. W.

EMPLASTRUM GALBANI COMPOSITUM. *U. S.* *Lond.* *Compound Galbanum Plaster.*

"Take of Galbanum *eight ounces;* Lead Plaster *three pounds;* Turpentine *ten drachms;* Burgundy Pitch, in powder, *three ounces.* Melt together the Galbanum and Turpentine; then add first the Burgundy Pitch, afterwards the Lead Plaster previously melted over a slow fire, and mix the whole together." *U.S.*

The *London* process differs only in directing the galbanum previously purified, (see *Gummi-resinæ*,) instead of the gum-resin in its ordinary state, and the concrete juice or unprepared resin of the Pinus Abies, instead of Burgundy pitch or the prepared resin.

It is a defect of the process of the United States Pharmacopœia, not to have ordered the galbanum purified, as it often contains foreign matters which must injure the plaster. It may be freed from these by melting it with a little water, straining, and evaporating to the due consistence. There is no necessity for employing the Burgundy pitch in powder.

This plaster is an excellent local stimulant in chronic scrofulous enlargements of the glands and joints. We have employed it with apparent advantage in some obstinate cases of this kind, which after having resisted general and local depletion, blistering, and other measures, have yielded under its use. As a discutient it is also employed in the induration which sometimes remains after the discharge of abscesses. It is said to have been useful in rickets when applied over the whole lumbar region, and has been recommended in chronic gouty or rheumatic articular affections. It should not be employed in the discussion of tumours in which any considerable inflammatory action exists.
W.

EMPLASTRUM GUMMOSUM. *Ed.* *Gum Plaster.*

"Take of Plaster of Semivitrified Oxide of Lead [Emplastrum Plumbi] *eight parts;* Gum Ammoniac, Galbanum, Yellow Wax, each, *one part.* To the melted Plaster and Wax, add the Gum-resins, previously melted and strained, and mix the whole thoroughly." *Ed.*

The addition of ammoniac adds little to the virtues of this plaster, which closely resembles the compound galbanum plaster in its effects. The galbanum and ammoniac are best prepared by dissolving them in a small quantity of hot water, straining the solution, and evaporating it to the proper consistence for mixing with the other ingredients.
W.

EMPLASTRUM HYDRARGYRI. *U.S., Lond., Ed.* *Mercurial Plaster.*

"Take of Mercury *six ounces;* Olive Oil, Resin, each, *two ounces;* Lead Plaster *a pound.* Melt the Oil and Resin together, and when they have become cool, rub the Mercury with them till the globules disappear; then gradually add the Lead Plaster, previously melted, and mix the whole together." *U.S.*

By the process of the *London College* three ounces of purified mercury are extinguished by trituration with a fluidrachm of sulphurated oil; a pound of lead plaster, previously melted, is then gradually added, and the whole mixed together. The *Edinburgh* process corresponds precisely, except in phraseology, with that of the United States Pharmacopœia.

The sulphurated oil employed by the London College is intended to facilitate the extinguishment of the mercury; but as it operates by the union of the sulphur with the metal forming an inefficient sulphuret, it impairs the virtues of the plaster at least as much as it assists in its preparation. The melted resin and oil of the United States and Edinburgh process are decidedly preferable.

This plaster is employed to produce the local effects of mercury upon venereal buboes, nodes, and other chronic tumefactions of the bones or soft parts, dependent on a syphilitic taint. In these cases it sometimes acts as a powerful discutient. It is frequently also applied to the side in chronic hepatitis or splenitis. In habits peculiarly susceptible to the mercurial influence, it occasionally affects the gums.
W.

EMPLASTRUM OPII. *Lond., Ed., Dub.* *Opium Plaster.*

"Take of Opium, in powder, *half an ounce;* Burgundy Pitch *three ounces;* Plaster of Semivitrified Oxide of Lead [Emplast. Plumbi] *a pound.* Add the Opium and Pitch to the Plaster, previously melted, and mix them horoughly." *Ed., Dub.*

"Take of Hard Opium, in powder, *half an ounce;* Resin of the Spruce ir [unprepared concrete juice of the *Pinus Abies*], in powder, *three ounces;* Lead Plaster *a pound;* Water *half a pint.* To the melted Plaster add the

Resin, Opium, and Water; and boil down with a slow fire until the ingredients unite into the consistence of a plaster." *Lond.*

The opium plaster is thought to relieve rheumatic and other pains in the parts to which it is applied. W.

EMPLASTRUM PICIS COMPOSITUM. *Lond.* *Compound Pitch Plaster.*

"Take of Burgundy Pitch *two pounds;* Resin of the Spruce-fir [unprepared concrete juice of the *Pinus Abies*] *a pound;* Yellow Resin, Yellow Wax, each, *four ounces;* Expressed Oil of Nutmegs *an ounce;* Olive Oil, Water, each, *two fluidounces.* To the Pitch, Resin, and Wax, melted together, add first the Resin of the Spruce-fir, then the Oil of Nutmegs, the Olive Oil, and the Water. Lastly, mix the whole, and boil down to the proper consistence." *Lond.*

The driest white turpentine may be substituted for the resin of the spruce-fir, which is not always to be obtained in this country.

This is a rubefacient plaster applicable to catarrhal and other pectoral affections, chronic inflammation of the liver, and rheumatic pains in the joints and muscles. It often keeps up a serous discharge, which requires that it should be frequently renewed. The irritation which it sometimes excites is so great as to render its removal necessary. W.

EMPLASTRUM PICIS CUM CANTHARIDE. *U.S.* EMPLASTRUM CALEFACIENS. *Dub.* *Plaster of Pitch with Spanish Flies. Warming Plaster.*

"Take of Burgundy Pitch *three pounds and a half;* Cerate of Spanish Flies *half a pound.* Melt them together by means of a water-bath, and stir them constantly till they thicken upon cooling." *U.S.*

The *Dublin College* employs the same proportions.

This plaster is an excellent rubefacient, more active than Burgundy pitch, yet in general not sufficiently so to produce vesication. Still, however, in consequence of a peculiar susceptibility of the skin in some individuals, it occasionally blisters; and it has been recommended to diminish the proportion of the flies. But, while such a reduction would render the plaster insufficiently active in most cases; it would not entirely obviate the objection, as the smallest proportion of flies would vesicate in certain persons, and even the Burgundy pitch alone sometimes produces the same effect. In whatever mode, therefore, this plaster may be prepared, it cannot always answerthe expectations which may be entertained; and the only plan, when the skin of any individual has been found to be very susceptible, is to accommodate the proportions to the particular circumstances of the case. Much, however, may be accomplished by proper care in the preparation of the plaster, towards obviating its tendency to blister. If the flies of the *Ceratum Cantharidis* should have been coarsely pulverized, the larger particles, coming in contact with the skin, will exert upon the particular part to which they are applied their full vesicatory effect, while, if reduced to a very fine powder, they would be more thoroughly enveloped in the other ingredients, and thus have their strength very much diluted. Now the former condition of the cerate when prepared for ordinary use is not objectionable, as the design in this case is to produce a blister. Hence particular care is neither necessary nor observed in powdering the flies under these circumstances. But as an ingredient of the warming plaster, the cerate should contain the cantharides as minutely divided as possible, and if that usually kept is not in the proper state, a portion should be prepared for this particular purpose.

The warming plaster is employed in chronic rheumatism, and various chronic internal diseases attended with inflammation or an inflammatory tendency, such as chronic catarrh, asthma, pertussis, phthisis, hepatitis, and the sequelæ of pleurisy and pneumonia. W.

EMPLASTRUM PLUMBI. *U.S. Lond.* EMPLASTRUM OXIDI PLUMBI SEMIVITREI. *Ed.* EMPLASTRUM LITHARGYRI. *Dub.* *Lead Plaster. Litharge Plaster.*

"Take of Semivitrified Oxide of Lead, in very fine powder, *five pounds;* Olive oil *a gallon;* Water *two pints.* Boil them together over a gentle fire, stirring constantly, until the Oil and Oxide of Lead unite into a Plaster. It will be proper to add a little boiling water, if that employed at the commencement be nearly all consumed before the end of the process." *U.S. Lond.*

The *Edinburgh College* orders one part of the semivitrified oxide of lead, two parts of olive oil, and a sufficient quantity of water. The *Dublin* process does not differ materially from that of the London and U.S. Pharmacopœias.

The importance of this plaster, as the basis of most of the others, requires that we should enter somewhat in detail into an account of the principles and manner of its preparation.

It was formerly thought that the oil and oxide of lead entered into direct union, and that the presence of water was necessary only to regulate the temperature, and prevent the materials from being decomposed by heat. The discovery, however, was afterwards made, that this liquid was essential to the process; and that the oil and oxide alone, though maintained at a temperature of 220°, would not combine, while the addition of water, under these circumstances, would produce their immediate union. It was now supposed that the oil was capable of combining only with the hydrated oxide of lead, and that the use of the water was to bring the oxide into this state; and in support of this opinion, the fact was advanced, that the hydrated oxide of lead and oil would form a plaster when heated together without any free water. (See *N. Am. Med. and Surg. Journ.* vol. i. p. 469.) But since the general reception of Chevreul's views in relation to oils and their combination with alkalies and other metallic oxides, the former opinions have been abandoned; and it is now admitted that the preparation of the lead plaster affords a genuine example of saponification, as explained by that chemist. The elements of the oil undergo a new arrangement, one portion of them, though comparatively small, uniting with a portion of the water to form a sweetish substance called *glycerine*, and the remainder, constituting more than ninety parts in the hundred, combining among themselves to produce two acid bodies, the *oleic* and *margaric acids*, to which, when animal fat is employed, instead of olive oil, a third is added, namely the *stearic.*[*] The plaster is formed by a union of these acids with the oxide, and, prepared according to the directions of the Pharmacopœias, is in fact an oleo-margarate of lead. The glycerine remains dissolved in the water or mechanically mixed with the plaster. That such is the correct view of the nature of this compound, is evinced by the fact, that if the oxide of lead be separated from the plaster by digestion at a moderate heat in very dilute nitric acid, the fatty matter which remains will unite with litharge with the greatest facility, without the intervention of water.

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[*] Berzelius thinks it probable that the margaric acid is a compound of the oleic and stearic, and that in fact only two acids are generated.

Other oleaginous substances and other metallic oxides are susceptible of the same combination, and some of them form compounds having the consistence of a plaster; but, according to *M. Henry* of Paris, who has fully investigated the subject, no oily matter except animal fat can properly be substituted for olive oil, and no metallic oxide, not even one of the other oxides of lead, for litharge. He ascertained, moreover, that the English litharge is preferable for the formation of the lead plaster to that obtained from Germany. Red lead, which is a deutoxide of that metal, forms a plaster with oil or fat, without the addition of water; but it is always of a deep brown colour, as if burnt. It is supposed, in this case, that the oil is acidified by the agency of the oxygen, which the deutoxide affords when heated.

Preparation. The vessel in which the lead plaster is prepared, should be of such a size that the materials will not occupy more than two-thirds of its capacity. The oil should be first introduced, and the litharge then sprinkled in by means of a sieve, the mixture being constantly stirred with a spatula. The particles of the oxide are thus prevented from coalescing in small masses which the oil would not easily penetrate, and which would therefore delay the process. Though water exerts an important chemical agency in the changes which occur, it is also useful by preventing too high a temperature, which would decompose the oil and cause the reduction of the metal. The waste must therefore be supplied by fresh additions as directed in the process; and the water added for this purpose should be previously heated, as otherwise it would not only delay the operation, but by producing explosion might endanger the operator. During the continuance of the boiling, the materials should be constantly stirred, and the spatula should be repeatedly passed along the bottom of the vessel, from side to side, so as to prevent any of the oxide, which is disposed by its greater density to sink to the bottom, from remaining in that situation. The materials swell up considerably in consequence partly of the vaporization of the water, partly of the escape of carbonic acid gas, which is liberated by the oily acids from some carbonate of lead usually contained in the litharge. (*Chevallier.*) The process should not be continued longer than is sufficient to produce complete union of the ingredients, and this may be known by the colour and consistence of the mass. The colour of the litharge gradually becomes paler, and at length almost white when the plaster is fully formed. The consistence increases with the progress of the boiling, and is sufficiently thick, when a portion of the plaster taken out and allowed to cool upon the end of a spatula, or thrown into cold water, becomes solid, without adhering in this state to the fingers. The portion thus solidified should not present, when broken, any red points, which would indicate the presence of a portion of uncombined litharge. When the plaster is formed, it should be removed from the fire, and after a short time cold water should be poured upon it; portions should then be detached from the mass and having been well kneaded under water, in order to separate the viscid liquid contained in the interior, should be formed into cylindrical rolls, and wrapped in paper.*

Medical Properties and Uses. This plaster, which has long been known under the name of *diachylon*, is used as an application to excoriated surfaces, and to slight wounds, which it serves to protect from the action of the air. It may also be beneficial by the sedative influence of the lead which enters into its composition. But its chief use is in the preparation of other plasters.

Off. Prep. Emplastrum Assafœtidæ, *U.S.*, *Ed.*; Emp. Ferri, *U.S. Ed.*;

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* For many of these remarks on the lead plaster, we are indebted to Chevallier's *Manuel du Pharmacien.*

Dub.; Emp. Galbani. *Dub.;* Emp. Galbani Comp. *U. S., Lond.;* Emp. Gummosum, *Ed.;* Emp. Hydrargyri, *U. S., Lond., Ed.;* Emp. Opii, *Lond., Ed., Dub.;* Emp. Plumbi Carbonatis, *U. S.;* Emp. Resinæ, *U. S., Lond., Ed., Dub.;* Emp. Saponis, *Lond., Ed., Dub.;* Emp. Saponis Comp., *Dub.* W.

EMPLASTRUM PLUMBI CARBONATIS. *U. S.* *Plaster of Carbonate of Lead.*

"Take of Carbonate of Lead *a pound;* Olive Oil *two pints;* Yellow Wax *four ounces;* Lead Plaster *a pound and a half;* Florentine Orris, in powder, *nine ounces.* Boil together the Oil and Carbonate of Lead, adding a little water, and constantly stirring, till they are thoroughly incorporated; then add the Wax and Plaster, and when these are melted sprinkle in the Orris, and mix the whole together." *U. S.*

In the first edition of the U.S. Pharmacopœia, the oil and carbonate of lead were directed to be boiled together by means of a water-bath, till they were incorporated; but they cannot be made to unite in this manner, and the present directions were very properly substituted in the last edition. According to the process as it now stands, a good plaster may be prepared, rather too soft, perhaps, at first, but soon acquiring the proper consistence.

The plaster of carbonate of lead was introduced into our Pharmacopœia as a substitute for *Mahy's plaster*, so much employed in some parts of the United States. It is an excellent application to surfaces inflamed or excoriated by friction; and may be resorted to with great advantage in those troublesome cases of cutaneous irritation, and even ulceration, occurring upon the back and hips during long continued confinement to one position.

Off. Prep. Ceratum Plumbi Carbonatis, *U. S.* W.

EMPLASTRUM RESINÆ *U. S., Lond.* EMPLASTRUM RESINOSUM. *Ed.* EMPLASTRUM LITHARGYRI CUM RESINA. *Dub.* EMPLASTRUM ADHÆSIVUM. *Resin Plaster. Adhesive Plaster.*

"Take of Resin, in powder, *half a pound;* Lead Plaster *three pounds.* To the Lead Plaster melted over a gentle fire add the Resin, and mix them." *U. S., Lond.*

The *Edinburgh College* orders five parts of the lead plaster and one of resin; the *Dublin,* three pounds and a half of the former, and half a pound of the latter.

This preparation differs from the lead plaster in being more adhesive and somewhat more stimulating. It is the common adhesive plaster of the shops, and is much employed for retaining the sides of wounds in contact, and for dressing ulcers according to the method of Baynton, by which the edges are drawn towards each other, and a firm support is given to the granulations. It is usually spread for these purposes upon muslin; and the spreading is best accomplished, on a large scale, by means of a machine, as described in the general observations upon plasters. It is kept in the shops ready spread; but as the plaster becomes less adhesive by long exposure to the air, the supply should be frequently renewed. When the skin is very delicate, it occasionally excites some irritation; and under these circumstances a plaster may be substituted, containing a smaller proportion of resin. That originally employed by Baynton contained only six drachms of resin to the pound of lead plaster.

In order to render the plaster more adhesive, and less brittle in cold weather, it is customary with many apothecaries to employ a considerable proportion of Burgundy pitch or turpentine in its preparation; but these additions are objectionable, as they greatly increase the liability of the plaster to irritate the skin, and thus materially interfere with the purposes for which the preparation was chiefly intended. If the remarks of Dr. Duncan on the compound soap plaster of the Dublin Pharmacopœia may be relied on, this might be advantageously substituted for the resin plaster in winter. (See *Emplastrum Saponis Compositum.*) W.

EMPLASTRUM SAPONIS. *Lond., Dub.* EMPLASTRUM SAPONACEUM. *Ed.* *Soap Plaster.*

"Take of Hard Soap, sliced, *half a pound;* Lead Plaster *three pounds.* Mix the Soap with the melted Plaster; then boil them down to the proper consistence." *Lond., Dub.*

"Take of Plaster of Semivitrified Oxide of Lead [Emplastrum Plumbi] *four parts;* Gum Plaster *two parts;* Hard Soap, sliced, *one part.* To the Plasters melted together add the Soap; then boil a little, so as to form a plaster." *Ed.*

In relation to the soap plaster of the London and Dublin Colleges, Dr. Montgomery, in his Observations upon the Dublin Pharmacopœia, makes the following remark. "I am informed by Mr. Scanlan, who prepares this plaster in large quantities, that the quantity of soap is twice too great, the plaster being, when prepared by this formula, quite pulverizable, and falling into crumbs." After the addition of the soap to the melted lead plaster, it is only necessary to continue the heat for a short time, till the soap is incorporated. Boiling is not necessary.

Soap plaster is considered discutient, and is sometimes used as an application to tumours.

Off. Prep. Emp. Belladonnæ, *Dub.;* Emp. Saponis Comp., *Dub.* W.

EMPLASTRUM SAPONIS COMPOSITUM vel ADHÆRENS. *Dub.* *Compound Soap Plaster, or Adhesive Plaster.*

"Take of Soap Plaster *two ounces;* Litharge Plaster with Resin [Emplast. Resinæ] *three ounces.* Make a plaster, which is to be melted and spread on linen." *Dub.*

Dr. Duncan, in his Dispensatory, makes the following observations in relation to this preparation. "The common resinous plaster is in cold weather too brittle, and apt to crack off from the linen on which it is spread; but by combining it in due proportion with soap plaster, it acquires greater pliability, without losing its adhesive property. In fact, this is the plaster commonly spread by a machine on webs of linen, and sold under the name of adhesive plaster." W.

ENEMATA. *Dub.*

Clysters.

These can scarcely be considered proper objects for officinal direction; but having been introduced into the Dublin Pharmacopœia, the plan of this work requires that we should notice them. They are substances in the liquid form, intended to be thrown up the rectum, with the view either of evacuating the bowels, or of producing the peculiar impression of a remedy upon the lower portion of the alimentary canal and neighbouring organs, or of acting on the system generally through the medium of the surface to which they are applied. They are usually employed to assist the action of remedies taken by the mouth, or to supply their place when the stomach rejects them, or is insensible to their impression. Sometimes they are preferably used, when the seat of the disorder is in the rectum or its vicinity.

As a general rule, three times as much of any remedy is required to produce a given impression by enema, as when taken into the stomach; but this rule should be acted on with caution, as the relative susceptibilities of the stomach and rectum are not the same in all individuals; and with regard to all very active remedies, the best plan is to administer less than the stated proportion. Attention should also be paid to the fact, that, by the frequent use of a medicine, the susceptibility of the stomach may be in some measure exhausted, without a proportionate diminution of that of the rectum.

When the object is to evacuate the bowels, the quantity of liquid administered should be considerable. For an adult from ten fluidounces to a pint, for a child of eight or ten years half that quantity, for an infant within the year from one to three fluidounces, are about the proper proportions. Much larger quantities of mild liquids may sometimes be given with safety and advantage; as the bowels will occasionally feel the stimulus of distention, when they are insensible to impressions of an irritating character.

When the design is to produce the peculiar impression of the remedy upon the neighbouring parts or the system, it is usually desirable that the enema should be retained; and the liquid vehicle should therefore be bland, and as small in quantity as is compatible with convenient administration. A solution of starch, flaxseed tea, or other mucilaginous fluid should be selected, and the quantity given should seldom exceed two or three fluidounces.

In every case, the patient should be instructed to resist any immediate disposition to discharge the injected fluid; and his efforts to retain it should be assisted, if necessary, by pressure with a warm folded towel upon the fundament.

The best instrument for administering enemata is an accurate metallic syringe. W.

ENEMA CATHARTICUM. *Dub.* *Cathartic Clyster.*

"Take of Manna *an ounce.* Dissolve it in *ten fluidounces* of Compound Decoction of Chamomile, and add of Olive Oil *an ounce*, Sulphate of Magnesia *half an ounce.*" *Dub.*

The laxative enema most commonly employed in this country, and in all respects equal to the above, consists of a tablespoonful of common salt, two tablespoonfuls of lard or sweet oil, the same quantity of molasses, and a pint of warm water. It has the advantage of consisting of materials which are always at hand in families. W.

ENEMA FŒTIDUM. *Dub*, *Fetid Clyster.*

"This is made by adding to the Cathartic Clyster two drachms of Tincture of Assafetida." *Dub.*

It is carminative and antispasmodic, as well as laxative; but when the peculiar influence of assafetida is desired by way of enema, we prefer the gum-resin itself rubbed up with hot water, in the proportion of one or two drachms to half a pint, of which the whole or a part may be given according to circumstances. W.

ENEMA OPII. *Dub.* *Clyster of Opium.*

"Take of Tincture of Opium *a drachm;* Warm Water *six ounces.* Mix them." *Dub.*

This contains too much both of the tincture and the vehicle. It must have happened to every one in the habit of prescribing opium in this way, to have seen a much greater effect produced by a certain amount of laudanum injected into the rectum than by one-third of the quantity swallowed.

The fluidrachm—the drachm of the Dublin formula—contains at least one hundred drops of laudanum of the ordinary size, aud not less than one hundred and twenty as they are often formed. From twenty to twenty-five drops are usually considered as a medium dose; so that the Dublin College orders five times as much by the rectum as is given by the mouth. Sixty drops, equivalent to about thirty minims, are abundantly sufficient. As the object is that the enema should remain in the rectum, the smaller the quantity of the vehicle the better; and a mucilaginous fluid is preferable to water, as it involves the tincture and prevents the irritation of the alcohol before the opium begins to take effect. The ordinary anodyne enema employed in this country consists of about sixty drops of laudanum and one or two fluidounces of flaxseed tea or solution of starch.

It is an admirable remedy in obstinate vomiting, strangury from blisters, painful affections of the kidneys, bladder, and uterus, and in the tenesmus of dysentery. It may also frequently be employed to produce the effects of opium upon the system; when circumstances prevent the administration of this medicine by the mouth. W.

ENEMA TEREBINTHINÆ. *Dub.* *Clyster of Turpentine.*

"Take of Common Turpentine *half an ounce;* the Yolk of one Egg. Rub them together, and add gradually *ten ounces* of Water of a temperature not exceeding 100°." *Dub.*

As the common turpentine alluded to in the formula is not usually kept in the shops of this country, we almost always employ the oil of turpentine, which is even more efficacious, and in no respect inferior for the purpose. (See *Oleum Terebinthinæ.*) W.

EXTRACTA.

Extracts.

Extracts, as the term is employed in the U.S. and London Pharmacopœias, are solid substances, resulting from the evaporation of the solutions of vegetable principles, obtained either by exposing the vegetable to the action of a solvent, or by expressing its juice in the recent state. The Edinburgh and Dublin Colleges make a distinction between those prepared from the infusions, decoctions, or tinctures, and those from the expressed juices of plants, calling the former *Extracta*, the latter *Succi Spissati*. But there is no such essential difference between these two sets of preparations, as to require that they should be separately classed; and something is gained in the simplicity of nomenclature, as well as of arrangement, which results from their union. We shall consider them under the same head, taking care, however, to detail distinctly whatever is peculiar in the mode of preparing each.

The composition of extracts varies with the nature of the vegetable, the character of the solvent, and the mode of preparation. The object is generally to obtain as much of the active principles of the plant, with as little of its inert matter as possible; though sometimes it may be desirable to separate the active ingredients from each other, when their effects upon the system are materially different; and this may be accomplished by employing a menstruum which, while it dissolves one, leaves the other untouched. The proximate principles most commonly present in extracts are gum, sugar, starch, tannin, extractive, colouring matter, salts, and the peculiar principles of plants; to which, when a spirituous solvent is employed, may usually be added resinous substances, fatty matter, and frequently more or less essential oil—gum and starch being excluded when the menstruum is pure alcohol. Of these substances, as well as of others which, being soluble, are sometimes necessarily present in extracts, we have taken occasion to treat under various heads in the Materia Medica. There is one, however, which, from its supposed almost uniform presence in this class of preparations, and from the influence it is thought to exert upon their character, deserves particular consideration in this place;—we allude to *extractive*, or, as it is sometimes called, *extractive matter.*

It has long been observed, that in most vegetables there is a substance, soluble both in water and alcohol, which, in the preparation of extracts, undergoes some chemical change during the process of evaporation, imparting to the liquid, even if originally limpid, first a greenish, then a yellowish-brown, and ultimately a deep brown colour, and becoming itself insoluble. This substance, originally called *saponaceous matter* by Scheele, afterwards received the more expressive name of *extractive*, derived from its very frequent presence in extracts. Its existence as a distinct principle is denied, or at least doubted by some chemists, who consider the phenomena supposed to result from its influence, as depending upon the mutual reaction of other principles; and in relation to Peruvian bark, it appears to have been proved, that the insoluble matter which forms during its decoction in water, is a compound of starch and tannin. A similar compound must also be formed in other cases when these two principles co-exist; but they are not always present in the same vegetable, nor can all the changes which have been attributed to the extractive, be accounted for by their union, even when they are present; so that till further light is shed on the subject, it is best to admit the existence of a distinct substance, which, though not the same in all plants, possesses sufficient identity of character to be entitled, like sugar, tannin, &c. to a distinctive name. The most interesting property of extractive is its disposition to pass, by the influence of atmospheric air at a high temperature, into an insoluble substance. If a vegetable infusion or decoction be evaporated in the open air to the consistence of an extract, then diluted, filtered, and again evaporated, and the process repeated so long as any insoluble matter is formed, the whole of the extractive will be separated from the liquid, which will then contain only the gum, sugar, saline matters, &c., which may have existed in the plant. If chlorine be passed through an infusion or decoction, a similar precipitate is formed with much greater rapidity. The change is usually ascribed to the absorption of oxygen by the extractive, which has therefore been called, in its altered condition, oxidized extractive; but De Saussure ascertained, that though oxygen is absorbed during the process, an equal measure of carbonic acid gas is given out, and the oxygen and hydrogen of the extractive unite to form water in such a manner as to leave the principle richer in carbon than it was originally. The name of oxidized extractive is therefore obviously incorrect, and Berzelius proposes to substitute for it that of *apothême*, synonymous with deposite. According to Berzelius, *apothême* is not completely insoluble in water, but imparts a slight colour to that liquid when cold, and is rather more soluble in boiling water, which becomes turbid upon cooling. It is still more soluble in alcohol, and is freely dissolved by solutions of the alkalies and alkaline carbonates, from which it is precipitated by acids. It has a great tendency, when precipitated from solutions, to unite with other principles, and to carry them along with it, thus acquiring properties somewhat different, according to the source from which it is obtained. In this way, also, even when the extractive of a plant is itself medicinally inert, its conversion into *apothême* may be injurious, by causing a precipitation of a portion of the active principle; and in practical pharmaceutic operations, this change should always, if possible, be avoided. With these preliminary views, we shall proceed to the consideration of the practical rules necessary to be observed in the preparation of extracts. We shall treat of the subject under the several heads, 1. of the extraction of the soluble principles from the plant; 2. of the method of conducting the evaporation; 3. of the proper condition of extracts, the changes they are liable to undergo, and the best methods of preserving them; and 4. of the general directions of the several Pharmacopœias in relation to them.

1. *Extraction of the Soluble Principles.*

There are two distinct modes of obtaining, in a liquid state, the principles which we wish to extract; 1. by expression; 2. by the agency of a solvent.

1. *By expression.* This method is applicable only to recent vegetables. All plants cannot be advantageously treated in this way, as many have too little juice to afford an appreciable quantity upon pressure, and of those which are succulent, a considerable proportion do not yield all their active principles with their juice. Succulent fruits, and various acrid and narcotic plants, are proper subjects of this treatment. With the exception of the fruit of the *Sambucus nigra*, the inspissated juice of which is directed by the Edinburgh and Dublin Colleges, all the vegetables from which officinal extracts are prepared in this way belong to the class of narcotics. The plants should be operated upon, if possible, immediately after their collection. Mr. Battley of London recommends that if not entirely fresh, they should be revived by the immersion of the stalks in water for twelve or eighteen hours, and those only used which recover their freshness by this management. They should then be cut into pieces, and bruised in a stone mortar till brought to a pulpy consistence. When the plant is not very succulent, it is necessary to add a little water during this part of the process, in order to dilute the juice. After sufficient contusion, the pulp is introduced into a linen or canvass bag, and the liquid parts expressed. The juice thus obtained is opaque and usually green, in consequence of the presence of green wax or chlorophylle, and of a portion of the undissolved vegetable fibre in a state of minute division. By heating the juice to about 160°, the albumen contained in it coagulates, and involving the chlorophylle and vegetable fibre, forms a greenish precipitate. If the liquid be now filtered, it becomes limpid and nearly colourless, and is prepared for evaporation. The clarification, however, is not absolutely necessary, and is generally neglected. Sometimes the precipitate carries with it a considerable portion of the active principle; in which case it should be subsequently incorporated with the juice, when reduced by evaporation to the consistence of a syrup.

2. *By solution.* The active principles of dried vegetables can be extracted only by means of a liquid solvent. The menstruum employed is either water or alcohol, or a mixture of the two. Water, on account of its cheapness, is always preferred, when circumstances do not strongly call for the use of alcohol. It has the advantage, moreover, that its operation may be assisted, if necessary, by a higher degree of heat than the latter. Pump water is often unfit for the purpose, in consequence of the quantity of its saline matter, which, in some instances, may exert an unfavourable influence on the active principle, and must always be left in the extract. Rain or river or distilled water should be preferred. Alcohol is employed when the principles to be extracted are insoluble, or but slightly soluble in water, as in the case of the resins; when it is desirable to avoid in the extract inert

substances, such as gum and starch, which are dissolved by water and not by alcohol; when the heat required to evaporate the aqueous solution would dissipate or decompose the active ingredients of the plant, as the volatile oils and the active principle of sarsaparilla; and finally, when the nature of the substance to be exhausted requires so long a maceration in water as to endanger spontaneous decomposition. The watery solution requires to be soon evaporated, as this fluid rather promotes than counteracts chemical changes; while an alcoholic tincture may be preserved unaltered for an indefinite period. An addition of alcohol to water is sufficient to answer some of the purposes for which the former is preferable; and the employment of both fluids is essential, when the virtues of the plant reside in two or more principles, all of which are not soluble in either of these menstrua. In this case it is usually better to submit the vegetable to the action of the two fluids successively, than to both united. Extracts obtained by the agency of water, are called *watery* or *aqueous extracts*, those by means of alcohol rectified or diluted, *alcoholic* or *spirituous extracts*.

The method of preparing the solution is by no means a matter of indifference. The vegetable should be thoroughly bruised, or reduced to the state of coarse powder, so as to allow the access of the solvent to all its parts, and yet not so finely pulverized as to prevent a ready precipitation of the undissolved and inactive portion. When water is employed, it is usual to boil the medicine for a considerable length of time, and if the first portion of liquid does not completely exhaust it, to repeat the operation with successive portions, till the whole of the active matter is extracted. This may be known by the sensible properties of the liquid, and by its influence upon reagents. But the boiling temperature produces decomposition of many vegetable principles, or at least so modifies them as to render them inert; and the extracts prepared by decoction are usually less efficient than those prepared with a less degree of heat. From numerous experiments upon extracts, Orfila concluded that their virtues were less in proportion to the heat used in their preparation. It is recommended, therefore, to substitute for decoction, the process of maceration, digestion, or hot infusion; in the first of which the liquid acts without heat, in the second is assisted by a moderately increased temperature sustained for a considerable time, and in the third is poured boiling hot upon the vegetable matter, and allowed to stand for a short period in a covered vessel. When the active principles are readily soluble in cold water, *maceration* is preferable to any other mode, as the starch which is inert, is thus left behind; but in many instances the preparation would spoil before the extraction would be completed. By *digestion*, though the solvent power of water is moderately increased, the advantage is more than counterbalanced by the increased disposition to spontaneous decomposition. *Infusion*, therefore, is generally preferred when decoction is not resorted to. A convenient mode of performing this process, is to introduce the solid material into a vessel with an opening near the bottom temporarily closed, or into a funnel with its mouth loosely stopped, then to pour on the boiling water, and having allowed it to remain a sufficient length of time, to draw it off through the opening. This operation may be repeated till the water comes away without any obvious impregnation. It is, however, always desirable to obtain the solution in the first place as concentrated as possible, so as to prevent the necessity of long continued evaporation, which has a tendency to injure the extract. It is better, therefore, to incur the risk, both where decoction and infusion are employed, of leaving a portion of the active matter behind, than to obtain a very weak solution. When successive portions of water are employed, those which are least impregnated should be brought by evaporation to the strength of that first obtained before being mixed with it, as the latter thus escapes exposure to unnecessary heat.

When alcohol is employed as a menstruum, the vegetable should be macerated in it for one or two weeks, and care should be taken that the tincture be as nearly saturated as possible. The extraction may be hastened by substituting digestion for maceration, as the moderate heat employed, while it facilitates the action of the alcohol, has in this case no effect in promoting decomposition, and the influence of the atmospheric air may be excluded by performing the process in close vessels. When alcohol and water are both used, it is best, as a general rule, to exhaust the vegetable with each separately, as the two menstrua require different modes of treatment.

By whatever process the extraction is effected, it requires the assistance of occasional agitation; and when the vegetable matter is very porous, and absorbs large quantities of the solvent, expression must be resorted to.

2. *Mode of conducting the Evaporation.*

In evaporating the solutions obtained in the modes above described, attention should always be paid to the fact, that the extractive matter is constantly becoming insoluble at high temperatures with the access of air, and that other chemical changes are going on, sometimes not less injurious than this, while the volatile principles are expelled with the vapour. The operator should, therefore, observe two rules; 1. to conduct the evaporation at as low a temperature as is consistent with other objects; 2. to exclude as much as possible the atmospheric air, and when this cannot be accomplished, to expose the liquid the shortest possible time to its action. According to Berzelius, the injurious influence of the atmospheric air is much greater at the boiling point of water that at a less heat, even allowing for the longer exposure in the latter case; and, therefore, a slow evaporation at a moderate heat is preferable to the more rapid effects of ebullition. Bearing these principles in mind, we shall proceed to examine the different modes in practice. First, however, it is proper to observe, that decoctions generally let fall upon cooling a portion of insoluble matter; and it is a question whether this should be rejected, or retained so as to form a part of the extract. Though it is undoubtedly in many instances inert, as in that of the insoluble tannate of starch formed during the decoction of certain vegetable substances, yet, as it frequently also contains a portion of the active principle which a boiling saturated solution necessarily deposites on cooling, and as it is difficult to decide with certainty when it is active and when otherwise, the safest plan, as a general rule, is to allow it to remain.

The method of evaporation usually resorted to in the case of the aqueous solutions is rapid boiling over a fire. The more quickly the process is conducted, the better, provided the liquid is to be brought to the boiling point; for the temperature cannot exceed this, and the length of exposure is diminished. But even where this method is employed, it should not be continued till the completion of the evaporation; for when most of the water has escaped, the temperature can no longer be kept down to the boiling point, and the extract is burnt. The caution, therefore, should always be observed of removing the preparation from the fire, before it has attained the consistence of thick syrup, and completing the evaporation either by means of a water-bath, or in shallow vessels, at a moderate heat. But this mode of evaporation is always more or less objectionable, and should never be employed, except in cases where the principles of the plant are so fixed and unchangeable as to authorize their extraction by boiling.

Evaporation by means of the water-bath, from the commencement of the process, is safer than the plan just mentioned, as it obviates all danger of burning the extract; but as the heat is not supplied directly from the fire, the volatilization of the water cannot go on so rapidly, and the temperature being the same, or very nearly so, when the water-bath is kept boiling, there is greater risk of injurious action from the air. The use of the vapour-bath, as suggested by M. Henry, is perhaps preferable; as it requires a smaller consumption of fuel, and the heat imparted to the liquid, while sufficient to evaporate it, is less than 212°. We take the following description of the apparatus employed at the Central Pharmacy of Paris, from M. Chevallier's highly useful Manual. It consists of a covered boiler, containing water, the vapour of which is conducted through a pipe into evaporating vessels, communicating with each other by means of metallic tubes. These vessels have the form of an ordinary copper basin, over the top of which is soldered a shallow tin capsule intended to contain the liquor to be evaporated. The vapour from the boiler circulates through these vessels, and the water into which it condenses is allowed to escape through a stop-cock attached to the bottom of each vessel. From the last one of the series a tube passes into a vessel of water; so as to afford a slight pressure against the escape of any excess of vapour. The liquid to be evaporated is first distributed in two or three capsules, but when considerably concentrated is transferred to a single one, where it is stirred towards the close of the process to hasten the evaporation. The heat applied to the liquid, if there are four vessels, is in that nearest the boiler about 198° F., in the fourth or most remote, about 135°. An incidental advantage of this apparatus is, that it affords a large supply of distilled water, which may be used for extracting the active matter from fresh portions of the vegetable, or for other purposes.

A good plan of evaporation, though slow, is to place the liquid in a broad shallow vessel, exposed in a stove or drying room to a temperature of about 100°, or a little higher, taking care that the air have free access, in order to facilitate the evaporation. This mode is particularly applicable to all those cases in which maceration or infusion is preferred to decoction for extracting the active principles. Berzelius says that we may thus usually obtain the extract in the form of a yellowish transparent mass, while those prepared in the ordinary way are almost black, and are opaque even in very thin layers. Even when the liquid is boiled at first, the process may often be advantageously completed in this manner.

Plans have been proposed and carried into execution for performing evaporation without the admission of atmospheric air. The apparatus for evaporation in vacuo, invented by Mr. Barry, and described in the Lond. Journ. of Science and Arts, vol. viii. p. 360, is well calculated to meet this object, at the same time that, by removing the atmospheric pressure, it enables the water to rise in vapour more rapidly, and at a comparatively low temperature. Another method is to place the liquid under an exhausted receiver, together with some concentrated sulphuric acid, or chloride of calcium, which, by its affinity for water, assists the evaporation of the liquid. But from the expense and trouble of these modes of evaporation, they are not calculated for general use.

A more convenient plan of excluding the air, though it does not at the same time meet the object of reducing the requisite degree of heat, is to distil off the water in close vessels. Berzelius says that this is the best mode of concentration next to that *in vacuo*. Care, however, must be taken, that the fire be not too long applied, lest the extract should be burnt. The process should, therefore, be completed by means of the water-bath.

In the concentration of alcoholic solutions, distillation should always be performed; as not only is the atmospheric air thus excluded, but the alcohol is recovered, if not absolutely pure, certainly fit for the purpose to which it was originally applied. Here also the water-bath should be employed to obviate any possible risk of injury from the fire. When a decoction or infusion, and tincture of the same vegetable have been made separately, they should be separately evaporated to the consistence of syrup, and then mixed together, while they are of such a consistence as to incorporate without difficulty. The object of this separate evaporation is, that the spirituous extract may not be exposed to the degree of heat, or lengthened action of the air, which is necessary in the ordinary mode of concentrating the infusion or decoction.

In every instance, care should be taken to prevent any portion of the extract from becoming dry and hard on the sides of the evaporating vessel, as in this state it will not readily incorporate with the remaining mass. The heat, therefore, should be applied to the bottom, and not to the sides of the vessel.

3. *Condition and Preservation of Extracts.*

Extracts are prepared of two different degrees of consistence, soft so that they may be readily made into pills, and hard that they may be pulverized. Those obtained from the expressed juices of plants are apt to attract moisture from the air, in consequence of the deliquescent nature of the salts existing in the juice. They are thus rendered softer, and more liable to become mouldy upon the surface. Others, especially such as contain much chlorophylle, harden by time, in consequence of the escape of their moisture; and it not unfrequently happens that small crystals of saline matter are formed in their substance. Most extracts, especially those containing azotized principles, when left to themselves, are capable of producing nitrates. The air, moreover, exercises an unfavourable chemical influence over the softer extracts, which are enfeebled, and ultimately become nearly inert, by the same changes which they undergo more rapidly in the liquid state at an elevated temperature. If an extract be dissolved in water, and the liquid be saturated with common salt, or any other very soluble salt of difficult decomposition, the greater part of it is precipitated, in consequence of the insolubility of this class of substances in saline solutions. The precipitate may be again dissolved in pure water. (*Berzelius.*)

Extracts, in order that they may keep well, should be placed in glazed earthenware, glass, or porcelain jars, and completely protected from the access of the air. This may be effected by covering their surface with a layer of melted wax, or with a piece of paper moistened with strong spirit, then closing the mouth of the vessel with a cork, spreading wax or rosin over this, and covering the whole with leather, or a piece of bladder. (*Duncan.*) The dry extracts, being less liable to be affected by atmospheric oxygen, do not require so much care. The application of alcohol to the surface has a tendency to prevent mouldiness. A method of protecting extracts from the action of the air frequently resorted to, is to cover them closely with oiled bladder; but this, though better than to leave them uncovered, is not entirely effectual. Should the extract become too moist, it may be dried by means of a water-bath; should it, on the contrary, be too dry, the proper consistence may be restored by softening it in the same manner, and incorporating with it a little distilled water. (*Chevallier.*)

Extracts from recent plants should always be prepared at the season when the plant is medicinally most active; and a good rule is to prepare them once a year.

4. *Officinal Directions.*

The Pharmacopœia of the *United States* and that of the *London College*, give the following general directions.

"In the preparation of the extracts, evaporate the moisture, as quickly as possible, in a broad, shallow dish, by means of a water-bath, until they have acquired the consistence proper for forming pills; and towards the end of the process, stir them constantly with a spatula.

"Sprinkle upon the softer Extracts a small quantity of Alcohol." *U. S. Lond.*

The *Edinburgh College* gives separate directions for different classes of extracts under the heads of *Succi Spissati*, or inspissated juices; *Extracta per Aquam*, or watery extracts; and *Extracta per Aquam et Alcohol*, or spirituous extracts.

1. *Succi Spissati.* "Bruise the fresh substance, and compress it strongly in a hempen bag that it may yield its juice, which is to be placed in shallow vessels heated in boiling water saturated with muriate of soda, and immediately reduced to the consistence of thick honey. The mass, when cold, is to be placed in glazed earthen vessels, and moistened with stronger alcohol." *Ed.*

2. *Extracta per Aquam.* "Having sliced and bruised the substance, pour upon it eight times its weight of distilled water. Boil to one-half, and strain with strong expression. Immediately evaporate the decoction to the consistence of thick honey, in a bath of boiling water saturated with muriate of soda." *Ed.*

3. *Extracta per Aquam et Alcohol.* "Upon a pound of the substance, in powder, pour four times its weight of stronger alcohol. Digest for four days, and pour off the tincture. Boil the residuum in five pounds of distilled water for fifteen minutes, and strain the decoction, boiling hot, through linen. Repeat the boiling and filtration with an equal quantity of distilled water, and evaporate the liquor to the consistence of thin honey. Draw off the alcohol from the tincture by distillation, till it becomes equally thick; then mix the inspissated liquors; and in a bath of boiling water saturated with muriate of soda, evaporate to the proper consistence." *Ed.*

The *Dublin College* also places the inspissated juices under a distinct head, and gives directions for the watery extracts, under the title of *Extracta Simpliciora*, omitting, probably through inadvertence, the classification of the spiritous extracts which it also orders.

1. *Succi Spissati.* "The leaves used in the preparation of the inspissated juices should be gathered about the period when the herb begins to flower. The inspissation is best effected by evaporating the superfluous moisture with a *medium* heat by means of a vapour bath, and constantly stirring with a spatula towards the close of the process." *Dub.*

2. *Extracta Simpliciora.* "All simple extracts unless otherwise ordered, are to be prepared according to the following rule. Boil the vegetable matter in eight times its weight of water, till the liquid is reduced one-half; then express, and after the subsidence of the dregs filter: evaporate the liquor with a *superior* heat (between 200° and 212°) until it begins to thicken; finally, inspissate it with a *medium* heat (between 100° and 200°) obtained by a vapour-bath, frequently stirring, till it acquires the consistence proper for the formation of pills." *Dub.*

W.

EXTRACTUM ACONITI. *U. S. Lond.* SUCCUS SPISSATUS ACONITI NAPELLI. *Ed.* SUCCUS SPISSATUS ACONITI. *Dub.* *Extract of Aconite.*

"Take of fresh Aconite [leaves] *a pound.* Bruise it in a stone mortar, sprinkling on it a little water; then express the juice, and evaporate it to the proper consistence." *U. S.*

The directions of the *London* and *Dublin Colleges* are the same as the above. The *Edinburgh College* orders all its inspissated juices, with the exception of that of elder berries, to be prepared according to its general formula. The reader will find the general officinal directions of the United States and British Pharmacopœias, at the close of our introductory observations in relation to extracts. Among these observations, he will also find rules which may be of practical use in regulating the various steps of the process under consideration.

In relation to the preparation of this extract, as well as of all those derived from the expressed juices of narcotic plants, the following summary of the plan pursued by Mr. Battley, an experienced apothecary of London, may be of service. Having passed the expressed juice through a fine hair sieve, he places it immediately upon the fire. Before it boils, a quantity of green matter rises to the surface, which in some plants is very abundant. This is removed by a perforated tin dish and preserved. It ceases to appear soon after the liquid begins to boil. The boiling is continued till rather more than half the fluid has been evaporated, when the decoction is poured into a conical pan and allowed to cool. An abundant dark green precipitate forms, from which the supernatant liquid is poured off, and having been reduced one-half by a second boiling, is again allowed to stand. The precipitate which now falls is less green than the first. The remaining fluid is once more placed over the fire, and allowed to boil till it assumes the consistence of syrup, when it is removed. The matter at first collected by filtration, together with that precipitated, is now incorporated with it, and the whole placed in a metallic pan, and by means of a water-bath evaporated to the consistence of an extract. In the latter part of the process, care is necessary to prevent any part of the extract from hardening on the sides of the vessel, as it thus loses its fine green colour and becomes proportionably feeble.

The superiority of this plan over a continuous boiling is, that the portions of active matter which are deposited at different stages of the process, are subjected for a shorter time to heat than if allowed to remain in the liquor, and consequently are less deteriorated. The matter which coagulates before the fluid boils, is chiefly albumen, embracing portions of chlorophylle and of the undissolved vegetable fibre. It might probably be thrown away without diminishing the virtues of the extract; but as the chlorophylle, though itself inactive, has often associated with it a portion of the active principle, it is the most economical plan to incorporate it with the other matters.

Mr. Brande states that one Cwt. of fresh aconite yields about five pounds of extract. According to Geiger, one pound yields an ounce and a half.

When properly prepared, by means of a water-bath, this extract has a yellowish-brown colour, with a disagreeable narcotic odour, and the acrid taste of the plant. By the officinal process, however, which is that of Störck, the leaves are not exhausted of their active matter, as the residue after expression is still very acrid. The Prussian Pharmacopœia, therefore, directs the residue to be digested in alcohol, and the tincture to be mixed and evaporated with the expressed juice. The extract thus prepared is said to be more acrid and more active as a medicine. The extract of aconite may be given in the dose of one or two grains; but a safer plan is to begin with half a grain night and morning, to be gradually increased till the system is affected. Twenty grains or more have been given in the course of a day. W.

EXTRACTUM ALOES PURIFICATUM. *Lond.* EXTRACTUM ALOES HEPATICÆ. *Dub.* *Purified Extract of Aloes.*

"Take of Extract of the Aloe Spicata, in powder, *a pound;* Boiling Water, *a gallon.* Macerate for three days with a gentle heat; then strain the liquor, and set it by that the dregs may subside. Pour off the clear liquor, and evaporate it to a proper consistence." *Lond.*

The *Dublin College* prepares this extract according to the general directions. (See page 829.)

As the London College calls aloes itself an extract, it gives this preparation necessarily the title of the purified extract. The object of the process is to separate the resinous matter, the *apothême* of Berzelius, which is supposed to irritate the bowels, without possessing purgative properties; but the truth appears to be, that, when deprived of a small proportion of adhering extractive, it is quite inert. It cannot, therefore, injuriously affect the virtues of the medicine; and as it exists in comparatively small proportion, and during the process a part of the extractive becomes insoluble, the preparation may be considered as at best unnecessary. The dose of the purified aloes is from five to fifteen grains. W.

EXTRACTUM ANTHEMIDIS. *U. S. Lond.* EXTRACTUM ANTHEMIDIS NOBILIS. *Ed.* EXTRACTUM CHAMÆMELI. *Dub.* *Extract of Chamomile.*

Take of Chamomile [dried flowers] *a pound;* Water, *a gallon.* Boil down to four pints, and strain the liquor while hot; then evaporate to the proper consistence," *U. S.*

This is also the process of the *London College.* For the mode of conducting the evaporation as directed in the United States and London Pharmacopœias, and applied to all the extracts, see page 829. The *Edinburgh* and *Dublin Colleges* prepare this extract according to the general process of the former for *watery extracts,* of the latter for *simple extracts.* (See page 829.)

According to Mr. Brande, one Cwt. of dried chamomile flowers affords upon an average 48 pounds of extract.

This extract has a deep brown colour, and the bitter taste of chamomile, but is wholly destitute of aroma, the volatile oil having been entirely driven off during the process. It does not, therefore, possess the peculiar virtues of the flowers; but is simply a mild bitter, which may sometimes be advantageously combined with laxatives and mineral tonics in debilitated states of the digestive organs. The dose is from ten to twenty grains. An extract may be prepared, having the peculiar flavour as well as bitterness of chamomile, by macerating the flowers in water, and evaporating the infusion in vacuo. W.

EXTRACTUM ARTEMISIÆ ABSINTHII. *Dub.* *Extract of Wormwood.*

This extract, which is directed only by the *Dublin College,* is prepared from the tops of Wormwood according to the general formula of that College for *simple extracts.* (See page 829.) It retains, to a certain extent, the bitterness of the plant, without the strong odour and peculiar taste dependent on the volatile oil which is driven off by the boiling. It is, however, in no respect superior to other bitter extracts, and is very seldom used. The dose is from ten to twenty grains. W.

EXTRACTUM BELLADONNÆ. *U.S., Lond.* Succus Spissatus Atropæ Belladonnæ. *Ed.* Succus Spissatus Belladonnæ. *Dub.* *Extract of Deadly Nightshade.*

This is prepared from the fresh leaves of the *Atropa Belladonna* in the manner directed for the extract of aconite. (See *Extractum Aconiti.*)

Mr. Brande states that one Cwt. of fresh belladonna yields from 4 to 6 pounds of extract. According to M. Recluz, nearly ten parts may be obtained from one hundred.

The extract of belladonna employed in this couutry is brought chiefly from England. It has usually a dark-brown colour, a slightly narcotic not unpleasant odour, a bitterish taste, and a soft consistence which it long retains. Asparagin has been found in this extract. (*Journ. de Pharm.*, xxi. 178.)

Its medical properties and uses have been detailed under the head of Belladonna. In relation, however, to its local employment, it may be proper to add to what we have already stated, that it is recommended by N. Chaussier and others in cases of protracted labour depending on rigidity of the os uteri. The extract, mixed with simple ointment, in the proportion of two drachms to an ounce, is applied at intervals directly to the neck of the uterus. With a similar view of producing relaxation, it has been employed locally in spasm of the urethra and painful constriction of the rectum; but care is requisite not to introduce it too freely into the bowel. It is often advantageously employed, in the shape of plaster or ointment, in local pains of a neuralgic or rheumatic character. (See *Emplastrum Belladonnæ.*) The dose of the extract is uncertain on account of its exceedingly variable strength. The best plan is to begin with one-quarter or one-half of a grain, repeated two or three times a day, and gradually to increase the dose till the effects of the medicine are experienced. To a child two years old not more than one-twelfth of a grain should be administered at first.

Off. Prep. Emplastrum Belladonnæ. *Dub.* W.

EXTRACTUM CINCHONÆ. *U.S.* Extractum Cinchonæ Lancifoliæ. *Ed.* *Extract of Peruvian Bark.*

"Take of Peruvian Bark, in powder, *a pound;* Alcohol *four pints;* Water *a gallon.* Macerate the Peruvian Bark with the Alcohol for four days, and pour off the tincture. Boil the residuum in four pints of the Water for a quarter of an hour, and strain the liquor, while hot, through linen: repeat the boiling with the four remaining pints of Water, aud strain as before; then evaporate the decoction to the consistence of thin honey. Distil the Alcohol from the tincture till this attains a similar degree of thickness; then mix the inspissated liquors, and evaporate to the proper consistence." *U.S.*

The Extract of the *Edinburgh College*, which is prepared according to their general directions for extracts by water and alcohol (see page 829) differs from ours only in being procured exclusively from the pale bark, while the United States Pharmacopœia leaves the choice of the variety to the physician or apothecary. (See *General Observations*, page 833.) W.

EXTRACTUM CINCHONÆ. *Lond., Dub.* *Extract of Peruvian Bark.*

"Take of Bark of the Cinchona Lancifolia [Pale Bark], bruised, *a pound;* Water *a gallon.* Boil down to six pints, and strain the liquor while hot. In the same manner boil the residue four times in an equal quantity of water, and strain. Lastly, mix all the decoctions together, and evaporate the mixture until it acquires a proper consistence.

"This extract should be kept *soft*, so as to be fit for forming pills, and *hard*, that it may be pulverized." *Lond.*

The *Dublin College* takes a pound of coarsely powdered pale bark and six pints of water; boils for fifteen minutes, in a loosely covered vessel, and filters the decoction while hot; boils the residue again in an equal quantity of water, and filters as before; repeats the boiling and filtration in like manner a third time; then mixes the decoctions, and evaporates them to a prope consistence. This College gives the same directions with that of London, in relation to the different states in which the extract should be kept. (See *General Observations* below.) W.

EXTRACTUM CINCHONÆ RESINOSUM. *Lond. Resinous Extract of Peruvian Bark.*

"Take of Bark of the Cinchona Lancifolia [Pale Bark], bruised, *two pounds;* Rectified Spirit *a gallon.* Macerate for four days, and strain. Distil the tincture, by means of a water-bath, until the extract acquires a proper consistence." *Lond.*

General Observations on the Extracts of Peruvian Bark. Of the different officinal extracts of bark for which directions are given above, we decidedly prefer that of the United States and Edinburgh Pharmacopœias. The aqueous extract of the London and Dublin Colleges is an injudicious preparation. In the first place, the water does not nearly exhaust the bark, and in the second, the boiling favours the formation of an insoluble compound of starch and tannin, which carries with it a portion of the alkaline principles, and though retained in the extract, is probably less efficient as a medicine than a more soluble compound containing an equal proportion of the active matter. According to the suggestion of M. Henry, Jun., it is not improbable that the different colouring matters in the bark act in relation to the quinia and cinchonia the part of an acid, sharing at a high temperature these bases with the kinic acid, and forming with them insoluble if not inert compounds. Besides, we cannot by any means be certain that a long continued heat of 212° may not determine an actual decomposition of a portion of these alkalies, and the formation of new principles. The London process is more objectionable than the Dublin, in proportion as the boiling which it directs is longer continued.

The alcoholic extract of the London College is a good preparation, containing probably most of the active matter of the cinchona; but we consider it inferior to that of the United States Pharmacopœia, inasmuch as the latter must necessarily embrace an equal proportion of the active matter, and in consequence of the use of water as a solvent, after the alcohol has performed its office, has probably an additional quantity, which the latter fluid may have left behind.

A very good extract of bark was formerly prepared in the shops of Philadelphia, by macerating the cinchona for a considerable length of time in a large proportion of water, and slowly evaporating the infusion, by a very moderate heat, in large shallow dishes placed upon the top of a stove. Before the use of the sulphate of quinia had superseded that of most other preparations of bark, we employed this extract with success in the treatment of intermittents, and found ten grains of it equivalent to nearly a drachm of the powdered cinchona.

Mr. Brande informs us that one Cwt. of fine crown bark (best pale bark) yields, on an average, 28 pounds of watery extract, and 25 pounds of alcoholic extract. The same kind of bark gave to M. Recluz, out of 100 parts, by maceration with cold water, 12.5 parts on an average of extract, by infusion with boiling water about 9.4 parts, by decoction from 12.5 to 18.75 parts, and by maceration in diluted alcohol (22° B.) from 25 to 31.3 parts. But the length of time for which the bark is submitted to the action of the solvent must have considerable influence on the proportion extracted, and of this we are not informed in the table from which we have taken the above results. (See *Dict. des Drogues.*)

It is best that the bark should be only coarsely powdered when submitted to decoction or maceration; as in this state it is sufficiently penetrable by the solvent, and more readily separated after being exhausted. The extract should always be brought to the hard dry state in which it may be pulverized, as it is thus less apt to be injured by exposure; and in the state of powder may be more uniformly incorporated with other substances.

Medical Uses. The extract of Peruvian bark is at present much less employed than before the discovery of quinia. It is still, however, occasionally prescribed as a tonic in combination with other medicines; and as it possesses, when properly prepared, most of the principles as they exist in the bark itself, it may be used in preference to the sulphate of quinia, whenever it is supposed that the latter is incapable of exerting all the curative influence of cinchona. The dose is from ten to thirty grains, equivalent to about a drachm of the powdered bark. W.

EXTRACTUM COLOCYNTHIDIS. *Lond.* EXTRACTUM COLOCYNTHIDIS SIMPLEX. *Dub.* *Extract of Colocynth.*

"Take of Pulp of Colocynth *a pound;* Water *a gallon.* Boil down to four pints, and strain the liquor while hot; then evaporate it to a proper consistence." *Lond., Dub.*

The proportion of colocynth is too large, if the pulp only, without the the seeds, is intended; as, in consequence of the porous nature of the medullary matter, it absorbs nearly the whole of the water, and almost precludes the possibility of boiling as directed. Dr. Duncan found half a pound of colocynth to contain 2770 grains of seeds, which boiled by themselves yielded almost nothing to water, and 800 grains of pith, which was easily boiled in four pounds of water, but absorbed almost the whole of it. The decoction, when expressed, although it contained no starch, gelatinized on cooling. By boiling the residuum in four pounds of fresh water, he obtained a decoction, which, mixed with that previously obtained, yielded upon evaporation 360 grains of a pale-brown, semi-transparent, dry, elastic extract, of intense bitterness.

The decoction is ordered to be strained while hot, because the gelatinous consistence which it assumes on cooling prevents it from readily passing through the strainer. The Parisian Codex directs, instead of the decoction, an infusion prepared by maceration in cold water. But the aqueous extract of colocynth, however made, is not an eligible preparation, as water does not dissolve the active bitter principle in large proportion, while it takes up much inert matter, so that the extract is even feebler than colocynth itself, without having any peculiar merit to recommend it. Besides, according to Mr. Brande, it is invariably either mouldy, or so tough and hard as to resist trituration and formation into pills. It has no place in our national Pharmacopœia, and might with propriety be discarded from those of London and Dublin. It is little used. The dose is from five grains to half a drachm. W.

EXTRACTUM COLOCYNTHIDIS COMPOSITUM. *U.S., Lond., Dub.* *Compound Extract of Colocynth.*

"Take of Pulp of Colocynth [without the seeds], sliced, *six ounces;*

Aloes, in powder, *twelve ounces;* Scammony, in powder, *four ounces;* Cardamom, in powder, *an ounce;* Soap [Castile] *three ounces;* Diluted Alcohol *a gallon.* Macerate the Pulp of Colocynth in the Diluted Alcohol, with a gentle heat, for four days. Strain the liquor, and add to it the Aloes, Scammony, and Soap; then evaporate to the proper consistence, and, near the end of the process, mix the Cardamom with the other ingredients." *U.S.*

The processes of the *London* and *Dublin Colleges* correspond with the above except in phraseology. The former College, however, designates the Socotrine Aloes, the latter, the Hepatic.

Soap was not embraced in the formula of the first edition of our Pharmacopœia; but has been added in imitation of the London process, in order to improve the consistence of the mass, which it renders more soluble in the liquors of the stomach when hardened by time. It may possibly also serve the purpose of qualifying the action of the aloes. Diluted alcohol is a much better solvent of the active principle of colocynth than water. The proper consistence alluded to in the process, is that which is adapted to the formation of pills.

This extract is an energetic and safe cathartic, possessing the activity of its three purgative ingredients, with comparatively little of the drastic character of the colocynth and scammony. It may be still further and advantageously modified by combination with rhubarb, jalap, calomel, &c., with one or more of which it is very often united in prescription. In such combination it is much employed wherever an active cathartic is desirable, particularly in the commencement of fevers and febrile complaints, in congestion of the liver or portal system, and in obstinate constipation. In small doses it is an excellent laxative in that state of habitual costiveness depending on a want of the due irritability of the bowels, which often occurs in old people. The dose is from five to thirty grains, according to the effect to be produced, and the susceptibility of the bowels. A very eligible combination is the compound cathartic pill of the U.S. Pharmacopœia.

Off. Prep. Pilulæ Catharticæ Compositæ, *U.S.* W.

EXTRACTUM CONII. *U.S., Lond.* SUCCUS SPISSATUS CONII MACULATI. *Ed.* SUCCUS SPISSATUS CONII. *Dub.* *Extract of Hemlock.*

This is prepared from the fresh leaves of the *Conium maculatum*, in the manner directed for extract of aconite. (See *Extractum Aconiti.*)

Mr. Brande observes, in relation to the inspissated juices generally, that light pressure only should be employed in separating the juice from the leaves; as the extract is thus procured greener, of a less glutinous or viscid consistence, and, in his opinion, more active than when considerable power is used in the expression. With regard to this particular extract, he states that its preparation "almost necessarily requires the use of a steam-apparatus, for in a water-bath the evaporation is so prolonged as to injure it, and over the open fire it invariably suffers from too high a temperature." (*Manual of Pharmacy.*) No one of the extracts is more variable in its qualities than this. The season at which the herb is collected, the place and circumstances of its growth, the method of preparing the extract, are all points of importance, and are all too frequently neglected. (See *Conium.*) In this country the process is often very carelessly conducted; and we are told by Dr. A. W. Ives, that large quantities of an extract prepared by boiling the plant in water and evaporating the decoction, have been sold as the genuine drug. The apothecary should always prepare the extract himself, or procure it from persons in whom he can have entire confidence. That imported from London is usually the best.

Extract of hemlock should have a fresh olive colour, a strong narcotic somewhat fetid odour, and a bitterish saline taste. According to Brande, from three to five pounds are obtained from one Cwt. of the leaves. M. Recluz got rather more than an ounce from sixteen ounces. Of the medical properties and application of this extract, we have spoken under the head of Conium. The dose is three grains twice a day, to be gradually increased till evidences of its action upon the system are afforded. It may be administered in pill or solution. W.

EXTRACTUM GENTIANÆ. *U.S., Lond., Dub.* EXTRACTUM GENTIANÆ LUTEÆ. *Ed.* *Extract of Gentian.*

This is prepared from bruised gentian, in the manner directed for extract of chamomile. (See *Extractum Anthemidis.*)

The French Codex directs maceration in cold water, instead of decoction as ordered by the U.S. and British Pharmacopœias for extracting the virtues of the root; and MM. Guibourt and Cadet de Vaux obtained by the former method an extract not only greater in amount, but more transparent, more bitter, and possessing more of the colour and smell of the root than that prepared by the latter. Guibourt attributes this result to the circumstance, that as gentian contains little, if any starch, it yields nothing to boiling which it will not also yield to cold water, while decoction favours the combination of a portion of the colouring matter with the lignin. Gentian, according to Brande, yields half its weight of extract.

As ordinarily procured, the extract of gentian is nearly inodorous, very bitter, of a dark brown colour approaching to black, shining, and tenacious. It is frequently used as a tonic in the form of pill, either alone or in connexion with metallic preparations. The dose is from ten to thirty grains. W.

EXTRACTUM HÆMATOXYLI. *U.S. Lond.* EXTRACTUM HÆMATOXYLI CAMPECHIANI. *Ed., Dub.* *Extract of Logwood.*

This is prepared from the raspings of logwood, in the manner directed for extract of chamomile. (See *Extractum Anthemidis.*)

The evaporation should be carried so far, that the extract may be dry and brittle when cold. About twenty pounds of it are obtained from one Cwt. of logwood. (*Brande.*) It is of a deep ruby colour, and an astringent sweetish taste; and possesses all the medical virtues of the wood from which it is procured. If given in pills, these should be recently made, as, when long kept, they are said to become so hard as sometimes to pass unchanged through the bowels. The extract, however, is best administered in solution. The dose is from ten to thirty grains. This extract is said to be prepared largely in Yucatan and other parts of Mexico. (*Journ. of the Phil Col. of Pharm.* vi. 87.) W.

EXTRACTUM HELLEBORI NIGRI. *U.S., Ed.* *Extract of Black Hellebore.*

This is prepared from the bruised root of the *Helleborus niger*, in the manner directed for extract of chamomile. (See *Extractum Anthemidis.*)

The virtues of black hellebore are either not completely extracted by boiling water, or are deteriorated by decoction; for the watery extract is little, if at all stronger than the root. It operates as a drastic purge in the dose of twelve or fifteen grains, but is seldom employed.

The French Codex gives a formula for preparing the extract of hellebore, according to the method of Bacher. Two pounds of the root and half a pound of carbonate of potassa are digested, with a moderate heat, for twelve hours, in eight pounds of alcohol of 22° B.; the tincture is strained with expression; the residuum is again digested with eight pounds of white wine for twenty-four hours; the wine is expressed, and having stood four hours to settle is decanted; the liquors are then mixed, and with a gentle heat evaporated to the consistence of an extract. One ounce of this extract, mixed with the same quantity of myrrh, and with ten scruples of the powdered leaves of the Centaurea benedicta, and made into pills of one grain each, constitutes the preparation known as the *tonic pills of Bacher*, formerly much used in amenorrhœa and dropsy, and probably not without advantage, especially in the former of these diseases. The dose is from ten to twenty pills during the day. An additional quantity of diluted alcohol might, without disadvantage, be substituted for the wine in the preparation of the extract. W.

EXTRACTUM HUMULI. *Lond.* EXTRACTUM HUMULI LUPULI. *Dub.* *Extract of Hops.*

"Take of Hops *four ounces;* boiling Water *a gallon.* Boil down to four pints, and strain the liquor while hot; then evaporate to a proper consistence." *Lond.*

The *Dublin College* orders this extract to be prepared according to its general formula for simple extracts. (See p. 829.)

Since the discovery of the fact that the active properties of hops reside chiefly in the lupulin, this extract has not been deemed an eligible preparation, and has been little used. It has the peculiar bitterness of the strobiles, without their aroma. Lupulin may be advantageously substituted for it in all cases in which it was formerly employed. Mr. Brande says that the average product of one Cwt. of hops is forty pounds of the extract. The dose is from ten to thirty grains. W.

EXTRACTUM HYOSCYAMI. *U. S.*, *Lond.* SUCCUS SPISSATUS HYOSCYAMI NIGRI. *Ed.* SUCCUS SPISSATUS HYOSCYAMI. *Dub.* *Extract of Henbane.*

This is prepared from the fresh leaves of the *Hyoscyamus niger*, in the manner directed for extract of aconite. (See *Extractum Aconiti.*)

It is seldom if ever made in this country, being derived chiefly from England. Mr. Brande says that one Cwt. of the fresh herb affords between four and five pounds. M. Recluz obtained about one part from sixteen.

The extract, as it reaches us, is of a dark olive colour almost black, of a narcotic rather unpleasant odour, and a bitterish, nauseous, slightly saline taste. It retains its softness for a long time; but at the end of three or four years becomes dry, and exhibits, when broken, small crystals of nitrate of potassa and chloride of sodium. (*Recluz.*) Like all the inspissated juices it is of variable strength, according to its age, the care used in its preparation, and the character of the leaves from which it was procured. (See *Hyoscyamus.*) In its use, therefore, it is necessary to begin with a moderate dose, two or three grains for instance, and gradually to increase the quantity till some effect is experienced, and the degree of efficiency of the particular parcel employed is ascertained. It is usually given in pill. W.

EXTRACTUM JALAPÆ. *U.S.*, *Lond.*, *Dub.* EXTRACTUM CONVOLVULI JALAPÆ. *Ed.* *Extract of Jalap.*

"Take of Jalap, in powder, *a pound;* Alcohol *four pints;* Water *a gallon.* Macerate the Jalap in the Alcohol for four days, and pour off the tincture. Add the Water to the residue, and boil down to two pints; then strain the tincture and decoction separately, and distil the former and evaporate the latter, till they acquire the consistence of thin honey. Lastly, mix them together, and evaporate to the proper consistence.

"Of this Extract, let a portion be kept in a *soft* state, fit for the formation of pills; and another *hard*, so that it may be pulverized." *U.S.*

The processes of the *London* and *Dublin Colleges* for this extract, correspond with the above in all essential points. The *Edinburgh College* prepares it according to their general formula for spirituous extracts, (see page 829,) which will afford a similar result.

Infusion in water might be advantageously substituted for the decoction to which the residuum of the jalap, after having been treated with alcohol, is subjected; as the virtues of the root may be thus extracted without the amylaceous matter, which serves only to augment the bulk, and impede the filtration or straining. But, according to M. Cadet de Gassicourt, water at ordinary temperatures acts so slowly, that fermentation takes place before the active matter is all dissolved. It is, therefore, necessary to digest with a heat of about 90° or 100° F., which, while it is insufficient for the solution of the starch, enables the water to take up all that it is desirable to extract. By the previous removal of the resin by means of alcohol, it is probable that the action of the water is facilitated. One Cwt. of jalap affords, according to Mr. Brande, about fifty pounds of aqueous extract and fifteen of resin. The product of the former is somewhat less by infusion than decoction; and the extract is proportionably stronger.

The extract of jalap is of a dark brown colour, slightly translucent at the edges, and tenacious when not perfectly dry. It has the medical properties of the root; but is not often exhibited alone, being chiefly used as an ingredient of purgative pills, for which it is adapted by the comparative smallness of its bulk. The dose is from ten to twenty grains, or rather more than half that of jalap.

Off. Prep. Pilulæ Catharticæ Compositæ, *U.S.*; Pulvis Scammonii Compositus, *Dub.*, *Lond.* W.

EXTRACTUM JUGLANDIS. *U.S.* *Extract of Butternut.*

This is prepared from the sliced inner bark of the root of the *Juglans cinerea*, in the manner directed for extract of chamomile. (See *Extractum Anthemidis.*)

Most of this extract kept in the shops is prepared by the country people, who are said to use the bark of the branches, and even the branches themselves, instead of the inner bark of the root, as directed by the Pharmacopœia. The heat is also improperly regulated, being applied too vigorously, or continued too long, so that the preparation is often injured. That it should have proved uncertain in the hands of many physicians is, therefore, not a matter of surprise. It should always be prepared by the apothecary, and from the inner bark of the root gathered in May or June.

The extract of butternut is of a black colour, sweetish odour, and bitter astringent taste. In the dose of twenty or thirty grains it acts as a mild cathartic. (See *Juglans.*) W.

EXTRACTUM LACTUCÆ. *Lond.* SUCCUS SPISSATUS LACTUCÆ SATIVÆ. *Ed.* *Extract of Lettuce.*

"Take of fresh Lettuce Leaves *a pound.* Bruise them in a stone mortar, sprinkling a little water upon them; then express the juice, and evaporate it unstrained, until it acquires a proper consistence." *Lond.*

This extract is prepared by the *Edinburgh College* from the plant, according to their general formula for the preparation of inspissated juices. (See page 829.)

Its claims to favourable notice are at least very questionable. Consisting chiefly of the common sap of the plant, which is inert, with a variable, but always small proportion of the milky secretion, on which the activity of lettuce depends, it is at best a feeble and uncertain preparation; and might very well be dispensed with. Lactucarium possesses all its virtues, with much greater strength and uniformity of action. It is accordingly used in this country to the exclusion of the extract. The dose of the latter is from five to fifteen grains. W.

SUCCUS SPISSATUS LACTUCÆ VIROSÆ. *Ed.* *Inspissated Juice of Strong-scented Lettuce.*

This is prepared from the plant, according to the general formula of the *Edinburgh College* for the preparation of their inspissated juices. (See page 829.)

It is not used in this country. The inspissated juice of our own wild lettuce—*Lactuca elongata*—has been proposed as a substitute, but has not found a place among the officinal preparations. (See *Lactuca Virosa* and *Lactuca Elongata.*) W.

EXTRACTUM NUCIS VOMICÆ. *Dub.* *Extract of Nux Vomica.*

"Take of Nux Vomica, rasped, *eight ounces;* Proof Spirit *two pints.* Digest in a close vessel for three days; filter the liquor, and express the remainder by a press. Add to the residue one pint and a half of Proof Spirit, digest for three days, and express. Mix the liquors, and having reduced them by distillation to one-fourth, evaporate to a proper consistence." *Dub.*

This extract, which is peculiar to the Dublin Pharmacopœia, is an active preparation of nux vomica, though not always of uniform strength, owing to the variable proportion of strychnia in the article from which it is prepared. M. Recluz obtained from sixteen ounces of the nux vomica, the average product of one ounce and a quarter. The dose of the extract is from half a grain to two grains, to be repeated three times a day. W.

EXTRACTUM OPII. *Lond.* EXTRACTUM OPII AQUOSUM. *Dub.* *Extract of Opium.*

"Take of Opium *sixteen ounces;* Water *a gallon.* Add a little Water to the Opium, and macerate for twelve hours that it may become soft; then, adding gradually the remainder of the Water, rub them until they are thoroughly mixed, and set the mixture by that the dregs may subside; lastly, strain the liquor, and evaporate it to a proper consistence." *Lond.*

"Take of Opium, sliced, *two ounces;* Boiling Water *a pint.* Rub the Opium with the Water for ten minutes, and, after a short interval, pour off the liquor. Triturate the remaining Opium with an equal quantity of boiling Water, for the same length of time, and pour off the liquor as before. Repeat the trituration a third time; then mix the liquors, and expose the mixture to the air for two days in an open vessel. Lastly, filter through linen, and evaporate the filtered liquor slowly to the consistence of an extract." *Dub.*

Of these two processes, that of the Dublin College is undoubtedly the best, as water boiling hot extracts more of the soluble principles of opium than at a lower temperature. M. Recluz obtained from sixteen ounces of the drug an average product of nine ounces by hot water, and only six by cold. But we can discover no advantage which either preparation has over opium itself. Though the dose may be somewhat smaller, yet that of opium is sufficiently small; and if there be any distinct principle in this drug which modifies in an unpleasant manner the action of the morphia, it is not left behind in the preparation of the watery extract. Nor has this preparation the advantage of greater uniformity, as the gum, extractive, &c., taken up by the water, bear no fixed proportion to the anodyne principle. It is highly probable, moreover, that the opium is not completely exhausted by either process. It certainly is not by that of the London College; for morphia may be extracted from the residuum of the operation. (*Brande.*) In the preparation, therefore, of the extract of opium, there is a loss of time and of active matter, without any equivalent gain; and there is the further disadvantage, that, as the extract does not possess equally with opium those external characters by which its quality may be decided, it is more liable to adulteration. We should, therefore, in every instance, prefer opium to the extract; but it is necessary that the latter should be selected of good quality, and should be freed from all adhering extraneous matters.

Under the impression that the stimulating and unpleasant effects of opium are owing to the narcotin, it has been proposed to separate this principle by submitting the extract to the operation of ether, which dissolves the narcotin and leaves the morphia with the other ingredients. Robiquet employed cold ether; but M. Dublanc; convinced that the whole of the narcotin was not thus extracted, proposed the following plan. "Take of watery extract of opium 16 ounces; dissolve it in 8 ounces of distilled water; introduce the solution into the water-bath of a still; pour upon it 104 ounces of pure ether; distil off 24 ounces of the ether; take apart the apparatus and decant the ether which floats on the top of the extract; wash the latter while hot with the distilled ether; concentrate the residual matter, dissolve it in distilled water, filter the solution, and evaporate to a proper consistence." It is very doubtful, however, whether any useful end is gained by this expensive operation, as it is not by any means conclusively settled that the narcotin does in fact produce the unpleasant effects which have been attributed to it; and even admitting the fact, the preparations of morphia, which are of uniform strength, are greatly preferable to the *denarcotized extract.*

The dose of the extract of opium prepared by the Dublin process is about one-half that of opium itself. The London extract, according to Brande, is never stronger, and is sometimes weaker than opium. W.

EXTRACTUM PAPAVERIS. *Lond.* EXTRACTUM PAPAVERIS SOMNIFERI. *Ed.* *Extract of Poppy.*

"Take of Poppy Capsules, freed from their seeds, and bruised, *a pound;* Boiling Water *a gallon.* Macerate for twenty-four hours, then boil down to four pints, strain the liquor while hot, and evaporate it to a proper consistence." *Lond.*

The *Edinburgh College* prepares the Extract of Poppy from the capsules prepared as above, according to their general formula for watery extracts. (See page 829.)

Mr. Brande observes, in relation to this extract, that if prepared over the open fire it is often nearly inert. He states, moreover, that it is apt to be of a troublesome consistence, too hard to be formed into pills, and too tough to be pulverized; and advises that it should always be carefully dried till it becomes sufficiently brittle to admit of being reduced to powder. One Cwt. of the capsules, without the seeds, yields, according to this author, the average product of 35 pounds of extract.

This preparation is little used in the United States. It possesses the virtues of opium, but is much inferior and less uniform in strength. The dose is from five to ten grains. W.

EXTRACTUM PODOPHYLLI. *U.S.* *Extract of May-apple.*

This is prepared from the powdered root of the *Podophyllum peltatum*, in the manner directed for the Extract of Jalap. (See *Extractum Jalapæ.*)

It is possessed of the purgative properties of the root, and may be given in the dose of from five to fifteen grains, but is little employed. It might be substituted in all cases for the extract of jalap. W.

EXTRACTUM QUASSIÆ. *U.S.* *Extract of Quassia.*

This is prepared from the raspings of Quassia, in the manner directed for the extract of chamomile. (See *Extractum Anthemidis.*)

According to M. Recluz, sixteen ounces of quassia yield by infusion in water seven drachms of extract; by maceration in alcohol of 19° Baumé, two ounces five drachms and a half. The difference between these quantities is so great that we suspect somem istake in the table of the Dictionnaire des Drogues from which we quote.

The extract of quassia is dark-brown or black, and excessively bitter. It is apt to become dry and disposed to crumble by time. It concentrates a greater amount of tonic power within a given weight than any other extract of the simple bitters; and may therefore be given with great advantage in cases in which it is desirable to administer this class of substances in as small a bulk, and with as little inconvenience to the patient as possible. The dose is about five grains, and should be given in the form of pill. W.

EXTRACTUM QUERCUS. *Dub.* *Extract af Oak Bark.*

This is prepared from the bark of the *Quercus Robur*, according to the general formula given by the Dublin College for the preparation of the *simple extracts*. (See page 829.)

The Dublin College alone orders this preparation, which may be considered as quite superfluous. The Quercus Robur, the bark of which is directed, is not a native of this country; but were it desirable to obtain the extract, the bark of our white oak—*Quercus alba*—might be advantageously substituted. The dose is from ten grains to a drachm. W.

EXTRACTUM RHEI. *Lond.*, *Dub.* *Extract of Rhubarb.*

"Take of Rhubarb Root, powdered, *a pound;* Proof Spirit *a pint;* Water *seven pints*. Macerate for four days with a gentle heat, then strain, and set the liquor by that the dregs may subside. Pour off the clear liquor, and evaporate it to the proper consistence." *Lond.*, *Dub.*

Rhubarb yields all its active matter to water and alcohol united; but as the proportion of the root insoluble in these fluids is only about 30 per cent. (20 according to Brande) the extract can be little stronger than rhubarb itself, even allowing that the active matter is not injured or dissipated in the process of its preparation. Unless the evaporation is performed with great care and with a very moderate heat, it is certain that this latter effect is produced to a greater or less extent, and the extract thus becomes even less efficient than the root. Among other consequences which result from the boiling temperature, is the formation of a compound of the tannin and starch which is insoluble in cold water, and upon its precipitation probably carries with it a portion of the purgative principle. There is, moreover, reason to believe that this principle is volatilizable by heat, and that a portion of it escapes with the vapour. This extract may, therefore, be very well dispensed with. It is not directed by the United States or Edinburgh Pharmacopœia. The only advantage, if it be one, which it possesses over powdered rhubarb is, that it may be given in solution; and the same object may be accomplished by employing the root itself in the state of infusion. The dose of the extract is from ten to thirty grains. W.

EXTRACTUM RUTÆ. *Dub.* EXTRACTUM RUTÆ GRAVEOLENTIS. *Ed.* *Extract of Rue.*

This is prepared by the *Edinburgh* and *Dublin Colleges* from the herb, according to their respective general formulæ for the preparation of the watery or simple extracts. (See page 829.)

The volatile oil, upon which the stimulant and antispasmodic properties of rue depend, is driven off in the preparation of the extract, which, therefore, answers no other purpose than that of a bitter tonic; and even in this respect it is inferior to the other bitter extracts. It is not used in this country. The dose is from ten to twenty grains. W.

SUCCUS SPISSATUS SAMBUCI. *Dub.* SUCCUS SPISSATUS SAMBUCI NIGRI. *Ed.* *Inspissated Juice of Elder.*

This is prepared by the Dublin College from fresh ripe elder berries in the same manner with the inspissated juice of aconite. (See *Extractum Aconiti.*)

The *Edinburgh College* orders *five parts* of the juice of ripe elder berries to be mixed with *one part* of refined sugar, and evaporated by a gentle heat to the consistence of pretty thick honey.

The elder berries employed in Europe are those of the *Sambucus nigra;* but the berries of the *Sambucus Canadensis*, which is a native of this country, will answer equally well. For the uses of this extract the reader is referred to the article *Sambucus* in the Materia Medica. W.

EXTRACTUM SARSAPARILLÆ. *Lond.*, *Dub.* *Extract of Sarsaparilla.*

"Take of Sarsaparilla root, sliced, *a pound;* Boiling Water *a gallon.* Macerate for twenty-four hours, and boil down to four pints; then strain the liquor while hot, and evaporate to a proper consistence." *Lond.*, *Dub.*

This extract can have little or no effect upon the system, as the active matter of sarsaparilla is either destroyed by chemical change or driven off at the heat of boiling water. Besides, it appears from the experiments of Hancock and others, that water is incapable of exhausting the root, and waste would be incurred, even admitting that the extract possessed some efficiency. Very different quantities have been obtained from different varieties of sarsaparilla, and even from different parcels of the same variety; but as the matter taken up by boiling water consists chiefly of starch, no inference as to the relative value of any particular specimen of the root can be drawn from a knowledge of the quantity of extract which it is capable of affording. From ten grains to a drachm of this preparation may be given for a dose.

A *spirituous extract* of sarsaparilla has been proposed by M. Beral, which probably contains the active matter of the root, and which well deserves the attention of pharmaceutists and physicians. It is prepared in the following manner. "Take of dilute alcohol of 20° B. [sp. gr. 0.9336] *sixteen pounds;* sarsaparilla, properly prepared, *two pounds.* Macerate the sarsaparilla in the dilute alcohol for a month; then decant, and filter through paper. Distil the tincture so as to draw off the alcohol, and concentrate the remaining liquid by means of a water-bath till it attains the consistence of a soft extract. The product is usually four ounces [a quarter of a pound]." (*Journ. de Pharm.* xv. 657.) The diluted alcohol extracts all the virtues of the root, leaving the inert fecula which encumbers the extract obtained by decoction; while the temperature requisite for the concentration of the tincture is insufficient to destroy the active principle. As the product of this operation is about one-eighth of the sarsaparilla employed, a drachm of the extract represents an ounce of the root. From ten to twenty grains of it may be given three or four times a day. We have ascertained by actual observation that it possesses in a high degree the acrid taste of sarsaparilla. W.

EXTRACTUM SARSAPARILLÆ FLUIDUM. *Dub.* *Fluid Extract of Sarsaparilla.*

"Take of the Root of Sarsaparilla, sliced, *a pound;* Water *twelve pints.* Boil them together for an hour, and pour off the liquor; then add twelve pints of water, and boil and decant as before. Express the liquor strongly from the residuary matter, and having mixed the decoctions, set the mixture by that the dregs may subside; then evaporate by continued boiling to thirty ounces [fluidounces], and add two ounces [fluidounces] of Rectified Spirit." *Dub.*

It has lately become very customary to employ a concentrated liquid preparation of sarsaparilla, under the name of *fluid extract.* It was probably in order to give some regularity to popular practice in this respect, that the Dublin College adopted the above process in the last edition of their Pharmacopœia. It is, however, to be regretted, that the preparation is not more in conformity with our present knowledge in relation to the pharmaceutical management of this root. There can be little doubt as to the almost total inefficiency of the fluid extract of the Dublin College. We should ourselves prefer the solid extract prepared according to the formula of M. Beral, detailed under the last head, to any concentrated liquid preparation; as we cannot be certain that the active principle is held in solution by a very small proportion of water, and if it be merely suspended, there may be a risk that due agitation may not be always practised in dispensing and administering the medicine. But if the popular inclination to this mode of preparation must be gratified, we should give a decided preference to the following formula of William Hodgson Jun. over any other which we have seen.

"Take of Sarsaparilla Root, bruised, *sixteen ounces;* Liquorice Root, bruised, Guaiacum Wood, rasped, Bark of Sassafras Root, each, *two ounces;* Mezereon *six drachms;* Diluted Alcohol *eight pints.* Digest for fourteen days at a common temperature; then strain, express, and filter. Evaporate the tincture in a water-bath to twelve fluidounces; then add eight ounces of white sugar, and remove from the fire as soon as the sugar is dissolved." (*Journ. of the Phil. Col. of Pharm.* ii. 285.)

Mr. Hodgson observes, that during the process a small quantity of resin separates and adheres to the sides of the vessel, apparently derived from the guaiacum wood. The advantages of this process are, that by means of the alcohol all the virtues of the root are extracted, while the low temperature required in its evaporation is not sufficient to impair these virtues. The preparation has been used in Philadelphia with great apparent advantage in secondary syphilis. The dose is a fluidrachm, equivalent to a drachm of the root, three or four times a day. W.

EXTRACTUM SPARTII SCOPARII. *Dub.* *Extract of Broom Tops.*

This is prepared from the tops of the *Spartium Scoparium,* according to the general formula of the *Dublin College* for the preparation of their simple extracts. (See page 829.)

It has laxative and diuretic properties; but is not employed in this country and seldom in Europe. The dose is from thirty grains to a drachm. W.

EXTRACTUM STRAMONII. *U.S., Lond., Dub.* *Extract of Thorn-apple.*

This is prepared, according to the U. S. Pharmacopœia, from fresh thorn-apple leaves, in the manner directed for extract of aconite. (See *Extractum Aconiti.*)

The *London* and *Dublin Colleges* prepare the extract from the *seeds*, according to the following formula. "Take of Thorn-apple Seeds *a pound;* Boiling Water *a gallon.* Macerate for four hours in a covered vessel near the fire; then take out the seeds, and after having bruised them in a stone mortar, return them to the liquor. Boil down to four pints, and strain the decoction while hot. Finally, evaporate to a proper consistence."

The extract of the U. S. Pharmacopœia, like the other inspissated narcotic juices, is an uncertain preparation, varying in strength according to the care used in conducting the process, and to the season at which the leaves are collected. M. Recluz obtained half an ounce of the extract from sixteen ounces of the leaves. The dose is a grain night and morning, to be gradually increased till it affects the system.

The extract of the seeds is more active in the same dose than that of the leaves, and would probably be still more efficient if prepared by maceration in diluted alcohol, instead of decoction in water as ordered by the London and Dublin Colleges. According to the table of Recluz, sixteen ounces of the seeds afford two ounces and two drachms of extract by maceration in diluted alcohol, and one ounce and a half by decoction. The dose to begin with is a quarter or half a grain twice a day, to be gradually increased. W.

EXTRACTUM TARAXACI. *U.S. Lond., Dub.* *Extract of Dandelion.*

This is prepared, according to the U. S. Pharmacopœia, from the fresh root of the *Leontodon Taraxacum*, in the manner directed for extract of chamomile. (See *Extractum Anthemidis.*)

The *London* process differs from that for extract of chamomile only in requiring a maceration of twenty-four hours previously to boiling. The *Dublin College* prepares the extract from both the herb and root, according to their general formula for the simple extracts. (See page 829.)

The extract is undoubtedly stronger, prepared from the root alone than from the whole plant. The month of August is the proper season for preparing it. Mr. Houlton, in a communication to the London Medico-Botanical Society, states that at this period the bruised roots yield by pressure nearly one-third of their weight of a thick cream-coloured fluid, in which the medical virtues reside. (*Lond. Med. and Surg. Journ.* vi. 78.) It is probable that this juice would afford by inspissation an extract much stronger than that prepared by the ordinary method. The product, however, would be much smaller. Mr. Brande informs us that one Cwt. of the fresh root affords from twenty to twenty-five pounds of extract by decoction in water.

This extract deteriorates by keeping, and should therefore be renewed annually. It is most conveniently given dissolved in cinnamon or mint water. The dose is twenty or thirty grains three times a day. (See *Taraxacum.*) W.

FERRUM.

Preparations of Iron.

LIMATURA FERRI PURIFICATA. *Ed.* *Purified Iron Filings.*

"Place a sieve over Iron Filings, and apply a Magnet, so that the Filings may be attracted upwards through the sieve." *Ed.*

The common iron filings, obtained from the workshops, are generally mixed with particles of brass and other substances, and hence require to be purified for medicinal use; but the above process effects this object imperfectly. The magnet will unquestionably attract the particles of iron; but these will often have attached to them certain impurities, which are carried up with them. The only way to obtain pure iron filings is to file a piece of pure iron with a clean file. The Paris Codex directs iron in an impalpable powder, prepared by porphyrizing bright and clean iron filings without water, and in dry weather. A dull black powder is formed, which must be carefully preserved from moisture. For the medical properties of iron filings, see *Ferrum* and *Ferri Ramenta* in the first part of this work. The dose is from five to twenty grains.

Off. Prep. Sulphas Ferri, *Ed.;* Tartras Potassæ et Ferri. *Ed.* B.

FERRI OXYDUM NIGRUM. *Dub.* OXIDUM FERRI NIGRUM PURIFICATUM. *Black Oxide of Iron.*

"Wash the Scales of the Oxide of Iron, found at the blacksmith's anvil, with water; and having dried them, separate them from impurities by means of a magnet. Then reduce them to powder, of which the finest particles are to be collected in the manner directed for the preparation of chalk. *Dub.*

"Let the Scales of the Oxide of Iron, found at the blacksmith's anvil, be purified by the application of a magnet; so that the smaller and purer Scales alone may be attracted." *Ed.*

The nature and composition of the scales of iron have been explained under the head of *Ferrum. Oxydi Squamæ.* By washing, they are freed from accidental impurities; and as they are not at the maximum of oxidation, they are capable of further purification by the use of the magnet, after which they are reduced to an impalpable powder, or left in the form of scales.

This preparation is not the regular black oxide, and besides, frequently contains metallic iron. A more uniform black oxide, and therefore preferable for medicinal use, is obtained by the following formula of the Paris Codex, adopted from Guibourt. Take of iron filings any quantity. Triturate them in a mortar, and then place them in a wide vessel of earthenware or porcelain. Pour water on them, until this liquid runs off perfectly limpid. Then incline the vessel a little, compress the filings, and allow them to drain for some miuutes; after which replace the vessel, stir the filings with an iron spatula, and add from time to time sufficient water to keep them moist. At the end of four or five days wash the filings to remove the black oxide formed and collect it on a filter. Lastly, compress the oxide and dry it.

Medical Properties and Uses. Black oxide of iron, when properly prepared, dissolves readily in the stomach, and is one of the best ferruginous preparations. Its general remediate powers coincide with those of the other chalybeates. (See *Ferrum.*) The dose is from five to twenty grains, two or three times a day.

Off. Prep. Tinctura Muriatis Ferri. *Ed.* B.

FERRI OXYDUM RUBRUM. *U.S.* OXIDUM FERRI RUBRUM. *Ed.* FERRI OXYDUM RUBRUM. *Dub.* *Red Oxide of Iron.*

"Take of Sulphate of Iron *any quantity.* Put it in a crucible, and expose it to an intense heat, till it is converted into a red substance. Wash this with boiling water, and afterwards dry it." *U.S.*

The *Edinburgh College* directs its officinal *dried* sulphate of iron to be violently heated, until it passes into a very red matter, and omits the ablution.

"Expose Sulphate of Iron to heat, until the water of crystallization is expelled. Then roast it by an intense fire as long as acid vapours arise. Wash the red oxide until the washings, when examined by litmus, appear free from acid. Lastly, dry it on bibulous paper." *Dub.*

When sulphate of iron, or *green vitriol,* is heated, it swells up, and undergoes the aqueous fusion, and afterwards, by losing its water of crystallization, becomes a dry white mass, consisting of anhydrous sulphate of iron. This, by the application of a strong heat, is decomposed; the iron becomes peroxidized at the expense of part of the acid, and sulphurous and sulphuric acids are given off. The peroxide, however, is not perfectly pure, but still contains a small portion of acid, to remove which it requires to be washed.

Properties, &c. Red oxide of iron is a reddish-brown, tasteless, insoluble powder, called *colcothar* in commerce. It should not be deliquescent, and should dissolve in muriatic acid, without effervescence. If it contain copper, its muriatic solution will deposite this metal on a bright rod of iron. It consists of two equiv. of iron 56, and three of oxygen 24=80. It is used only in the preparation of other compounds.

Off. Prep. Emplastrum Ferri, *U.S., Ed., Dub.;* Ferrum Ammoniatum, *U.S., Ed.* B.

FERRI ACETAS. *Dub.* *Acetate of Iron.*

"Take of Carbonate of Iron *one part;* Acetic Acid *six parts.* Digest for three days, and filter." *Dub.*

As the carbonate of iron contains both oxides of the metal, this preparation is a mixed solution of the protacetate and peracetate of iron. From comparative experiments made by Dr. Perceval of Dublin, it was found that the carbonate was more soluble in acetic acid than the oxides of iron or the metal, and hence it was selected for this formula. Of ten grains of the following ferruginous preparations digested in two drachms of acetic acid, sp. gr. 1.065, half a grain was dissolved of the scales of iron, one and a quarter grains of the red oxide, three and a quarter of iron filings, and the *whole* of the carbonate.

Properties, &c. This solution has a deep red colour, and an acid and strongly chalybeate taste. When exposed to heat it yields acetic acid. It possesses the general medical properties of the preparations of iron. The dose is from ten to twenty-five drops, taken in water. It is not used in this country. B.

FERRI ACETATIS TINCTURA. *Dub.* *Tincture of Acetate of Iron.*

"Take of Acetate of Potassa *two parts;* Sulphate of Iron *one part;* Rectified Spirit *twenty-six parts.* Rub the Acetate of Potassa and Sulphate of Iron together in an earthenware mortar, until they unite into a mass. Dry this with a medium heat, and triturate it with the Spirit. Digest the mixture in a well stopped bottle for seven days, shaking it occasionally. Lastly, pour off the tincture from the sediment, and preserve it in a well stopped bottle." *Dub*

This preparation was introduced into the Dublin Pharmacopœia by Dr. Perceval. In the process, a double decomposition takes place between the salts employed, resulting in the formation of the acetate of iron which dissolves in the spirit, and sulphate of potassa which remains behind, being insoluble in that menstruum. The tincture also contains a portion of acetate of potassa; more of this salt being employed than is necessary to decompose the sulphate of iron.

Properties. This tincture is a transparent liquid, of a dead claret colour, and strong chalybeate taste. When evaporated to dryness, it yields a saline matter, which is whitish from the presence of acetate of potassa. It is extremely liable to spontaneous decomposition, and is decomposed by the alkalies and their carbonates, the strong acids, and the astringent vegetable infusions.

Medical Properties and Uses. This preparation is represented to be an agreeable chalybeate; but it possesses no particular virtue, which can give it any advantage over other medicines of the same class. The dose is from one to two teaspoonfuls, mixed with water or other convenient vehicle. B.

TINCTURA ACETATIS FERRI CUM ALCOHOL. *Dub.* *Tincture of Acetate of Iron with Alcohol.*

"Take of Sulphate of Iron, Acetate of Potassa, each, *an ounce;* Alcohol *two pints.* Rub the Acetate of Potassa and Sulphate of Iron together in an earthenware mortar, until they unite into a soft mass; then dry this with a medium heat, and as soon as it has grown cold, triturate it with the alcohol. Digest the mixture in a well stopped bottle for twenty-four hours, shaking it occasionally. Lastly, pour off the clear tincture from the sediment, and keep it in a well stopped bottle." *Dub.*

This formula is nearly the same with the last; the points of difference being that equal weights of the saline materials are employed; and the menstruum is the alcohol of the *Dublin* College, and not rectified spirit. The double decomposition takes place as in the preceding preparation, and with the same results; but here, instead of there being an excess of acetate of potassa to enter into the tincture, there is an excess of sulphate of iron. The acetate of iron formed is a mixture of protacetate and peracetate; but the latter only is soluble in the strong alcohol of the Dublin College. Hence this tincture may be viewed as an alcoholic solution of the peracetate of iron. It is necessary here not to confound the Dublin "alcohol," which has the sp. gr. 0.810, with the U.S. "alcohol," which corresponds with the rectified spirit of the British Colleges.

This preparation is stronger, and less liable to spontaneous decomposition than the preceding; while its sensible and medical properties are nearly the same. A fluidounce of it, when evaporated, yields ten grains of a crimson coloured extract, which at first has the consistency of wax, but afterwards, when dried, is transparent. It is not easy to perceive the motive of the Dublin College for having two spirituous preparations of the acetate of iron. B.

FERRI CARBONAS PRÆCIPITATUS. *U.S.* FERRI SUBCARBONAS. *Lond.* CARBONAS FERRI PRÆCIPITATUS. *Ed.* FERRI CARBONAS. *Dub.* *Precipitated Carbonate of Iron.*

"Take of Sulphate of Iron *eight ounces;* Carbonate of Soda *six ounces;* Boiling Water *a gallon.* Dissolve the Sulphate of Iron and Carbonate of Soda severally in four pints of the Water; then mix the solutions, and set the mixture by that the powder may subside; lastly, having poured off the supernatant liquor, wash the Carbonate of Iron with hot water, wrap it in bibulous paper, and dry it with a gentle heat." *U.S.*, *Lond.*

The *Edinburgh College* directs *four ounces* of sulphate of iron, *five ounces* of subcarbonate of soda, and *ten pounds* of water; the *Dublin*, *twenty-five parts* of sulphate of iron, *twenty-six parts* of carbonate of soda, and *eight hundred parts* of water. The materials are then treated as in the above formula.

When the solutions of carbonate of soda and sulphate of iron are mixed together, a hydrated protocarbonate of iron of a green colour is thrown down, and sulphate of soda remains in solution. The equivalent quantities of the *crystallized* salts for mutual decomposition are 130.1 of the sulphate and 143.42 of the carbonate; so that six ounces of the alkaline carbonate are not sufficient to decompose eight ounces of the ferruginous salt, the proportions of the U.S. and London formulæ. The Edinburgh formula gives an excess of the carbonate of soda, while the Dublin proportions are not far from accurate. The precipitate is altered by drying, during which it absorbs oxygen, and loses more or less carbonic acid, whereby it becomes in part converted into hydrated peroxide of iron. When prepared with the greatest care, Mr. Phillips found it to contain 15 per cent. of carbonic acid; but ordinarily it contains about 5 per cent. of this acid; and if improperly made, not more than 1½ per cent. The precipitate always contains more carbonic acid, when the saline solutions for generating it are mixed at the temperature of 150°. As it does not readily subside, it is best separated by a filter, on which also the washing may be performed. Either of the fixed alkalies will answer to decompose the ferruginous sulphate; but the carbonate of soda is preferred, because it gives rise to the sulphate of soda, which, from its greater solubility, is washed away more readily than the sulphate of potassa. The precipitate should be dried at a heat not exceeding 200°; as above that temperature it would lose almost all its carbonic acid, and be reduced nearly to the state of peroxide.

Properties. Precipitated carbonate of iron is a reddish-brown powder of a slightly styptic taste; insoluble in water, but dissolving readily in acids with effervescence of carbonic acid. When imperfectly prepared it has a colour less inclining to brown, and is not so easily dissolved by acids, scarcely any effervescence being produced. It is incompatible with acids and acidulous salts. Its composition varies exceedingly, from the influence of slight differences in the mode of conducting the process for preparing it. Though called a carbonate, it is, strictly speaking, a mixture of hydrated peroxide of iron with the protocarbonate. Part of the protoxide of the precipitate, as first thrown down, is converted into hydrated peroxide in drying; and as carbonic acid will not combine to any extent with this oxide, nearly all the acid is given off which was united with the protoxide changed. It is so difficult to prevent the absorption of oxygen by the precipitate during exsiccation, that a perfect protocarbonate of iron can probably only be obtained in the humid way. (See *Mistura Ferri Composita.*) Still, however, with care, a considerable part of the protocarbonate will remain undecomposed; and there is reason to believe that the activity of the preparation will be in proportion to its amount.

Medical Properties and Uses. Precipitated carbonate of iron is one of our best chalybeates. Its virtues are those of a tonic, alterative, and emmenagogue, and it is employed for all the purposes to which the preparations of iron are generally applicable. It was recommended by Mr. Carmichael in cancer, and is said sometimes to prove useful. Mr. Hutchinson brought it into notice as a remedy for neuralgia; and an extensive experience with it in that disease has established its value. It is also useful in chorea. When prescribed as a tonic, the usual dose is from five to thirty grains three times a day, given in pill or powder, and frequently combined with aromatics and vegetable tonics. In neuralgia and chorea it is administered in doses of a drachm or more. We have given it in these diseases with success, and in doses of from one to two teaspoonfuls three times a day. No nicety need be observed in the dose; its only obvious effect in very large doses being a slight nausea and a sense of weight at the stomach. Its use gives the stools a black colour.

Off. Prep. Ferri Acetas, *Dub.;* Ferri et Potassæ Tartras, *U.S.;* Ferrum Ammoniatum, *Lond.;* Tinctura Ferri Muriatis, *U.S.*, *Lond.* B.

FERRI CARBONAS PRÆPARATUS. *U.S.* SUB-CARBONAS FERRI PRÆPARATUS. *Ed.* FERRI RUBIGO. *Dub.* *Prepared Carbonate of Iron. Rust of Iron.*

"Take of Iron Wire, cut into pieces, *any quantity.* Expose the Iron to the air, frequently moistening it with Water, till it is converted into rust. Rub this in an iron mortar, and prepare it in the manner directed for carbonate of lime." *U.S.*

"Moisten Purified Iron Filings frequently with Water, that they may be converted into rust, which is to be ground into an impalpable powder." *Ed.*

The *Dublin* process is almost identical with that of the U.S. Pharmacopœia.

Rust of iron, according to Berzelius, is a hydrated peroxide of iron, containing frequently a little protocarbonate. It is formed in consequence of the decomposition of the water, the oxygen of which converts the iron chiefly into peroxide, but partly also into protoxide, the latter of which becomes protocarbonate by absorbing carbonic acid from the atmosphere. Iron, in the form of wire, is, on account of its greater purity, preferable to the filings for forming this preparation. Though called a carbonate and a subcarbonate, it is hardly entitled to either appellation; as it sometimes contains no carbonate, and this salt, when present, is in variable quantity.

Properties, &c. Prepared carbonate of iron is in the form of a red powder of a slightly styptic taste. Its medical properties and dose are the same as those of the precipitated carbonate; but from its difficult solubility in acids it is far less eligible, and might, without detriment, be expunged from the officinal catalogue. (See *Ferri Carbonas Præcipitatus.*)

Off. Prep. Muriatis Ferri Liquor, *Dub.* B.

FERRI ET POTASSÆ TARTRAS. *U.S.* FERRUM TARTARIZATUM. *Lond.* TARTRAS POTASSÆ ET FERRI. *Ed.* FERRI TARTARUM. *Dub.* *Tartrate of Iron and Potassa.*

"Take of Precipitated Carbonate of Iron *half an ounce;* Supertartrate of Potassa *an ounce;* Distilled Water *a pint.* Boil them together over a gentle fire, in a glass vessel, for an hour, and filter the solution through paper. After it has become cold, again filter it, and evaporate by means of a water-bath, till the Tartrate of Iron and Potassa is entirely dried. Rub this into powder, and keep it in a well stopped bottle." *U.S.*

"Take of Iron *a pound;* Supertartrate of Potassa, in powder, *two pounds;* Distilled Water *five pints*, or *a sufficient quantity.* Rub together the Iron and Supertartrate of Potassa, and expose the mixture, in an open glass vessel, with a pint of Water, to the action of the air for twenty days, stirring it daily, and keeping it always moist by occasional additions of Distilled Water. Then boil it in four pints of Distilled Water for fifteen minutes, and filter. Evaporate the solution, by means of a water-bath, until the Tartarized Iron is perfectly dried. Rub this into powder, and preserve it in a well stopped bottle." *Lond.*

The *Edinburgh College* orders *one part* of purified iron filings, *two parts* of supertartrate, and *one part* of water, employs an earthen vessel, and exposes the mixture for fifteen days. The materials are then boiled for a short time with four times their weight of water, and the clear liquor poured off from the dregs. This is evaporated to dryness by means of a water-bath, and the dry mass reduced to powder and kept in close bottles. The *Dublin College* directs *one part* of fine iron wire, *four parts* of supertartrate, and *eight parts* or *a sufficient quantity* of distilled water, and treats the materials nearly as directed in the Edinburgh formula; the differences being that the iron during exposure is not to be entirely covered with water, that filtration is substituted for decantation, and that the product is not reduced to powder.

In these processes, the excess of acid in the supertartrate of potassa combines with protoxide of iron to form a prototartrate; which by the action of the air is converted into a pertartrate, and the resulting preparation is a double salt composed of pertartrate of iron and tartrate of potassa. In the U.S. process, which is that of the Dublin Pharmacopœia of 1807, the protoxide of iron is furnished by the precipitated carbonate; in those of the British Colleges, by the slow oxidation of metallic iron. As the precipitated carbonate contains only a small portion of protoxide, and the peroxide does not directly unite with the excess of acid of the cream of tartar, the U.S. process is liable to the objection of furnishing but a small product, an objection which caused the Dublin College to abandon it. Dr. Barker, in his Observations on the Dublin Pharmacopœia, states that the use of the precipitated carbonate gives rise to a large residue of undissolved cream of tartar and carbonate, and furnishes an *acid* product. When, however, metallic iron was used with the cream of tartar, mutual reaction gradually took place, and a dark brown *neutral* solution was obtained, which, when evaporated to dryness, furnished a mass of a resinous appearance, and completely soluble in water. When metallic iron is employed, it is protoxidized by the oxygen of the water, hydrogen being given off, and the protoxide formed immediately unites with the excess of acid in the cream of tartar. By the action of the air, the protoxide is converted into peroxide, and the prototartrate, consequently, into pertartrate. Fine iron wire is, perhaps, preferable to the filings, as these are apt to be impure. The only material difference between the British formulæ, is that the Dublin College uses only half as much iron as the other Colleges. The smaller quantity is probably quite sufficient, though no injury can result from the use of an excess of the metal.

Properties. Tartrate of iron and potassa is an olive-green powder, and, when properly prepared, has a sweetish and rather agreeable taste. If it contain an excess of acid from the imperfect saturation of the cream of tartar, its taste is disagreeable. When exposed to a damp atmosphere it becomes moist, and hence it requires to be preserved in close bottles. It is soluble in seven times its weight of water, forming a solution not liable to decomposition for a considerable time. It is not decomposed by the fixed alkalies or their carbonates in the cold, by ammonia, pure or carbonated, at any temperature, nor by ferrocyanate of potassa. It is incompatible with astringent vegetable infusions, the strong acids, hydrosulphuric acid gas, lime-water, and acetate of lead. According to Phillips it contains about 20 per cent. of peroxide of iron.

Dr. Ure has proposed the medical use of *prototartrate of iron.* He makes it by acting on clean iron filings, or bits of iron wire, with a solution of tartaric acid. The iron is protoxidized at the expense of the water, and uniting with the tartaric acid produces the prototartrate in the form of a powdery matter, which is obtained separate by diffusing it through the liquid, decanting, and washing on a filter. This salt is nearly white, pulverulent, and insoluble, and possesses a mild chalybeate taste.

Medical Properties and Uses. Tartrate of iron and potassa is one of the most agreeable preparations of iron, and may be given, generally, in cases in which chalybeates are indicated. From its slight taste when well prepared, and its ready solubility, it forms one of the best ferruginous preparations for exhibition to children. The dose is from ten grains to half a drachm, given in solution, or combined with an aromatic or bitter in the form of bolus. B.

VINUM FERRI. *Lond.* *Wine of Iron.*

"Take of Iron [wire or filings] *a drachm;* Supertartrate of Potassa, in powder, *six drachms;* Distilled Water *two pints*, or *a sufficient quantity;* Proof Spirit *twenty fluidounces.* Rub together the Iron and Supertartrate of Potassa, and expose them to the air for six weeks, in a shallow glass vessel, with *a fluidounce* of the Water, stirring daily with a spatula, and occasionally adding Distilled Water, so that the mixture may be always moist. Then dry it with a gentle heat, rub it into powder, and mix it with *thirty fluidounces* of the Distilled Water. Filter the solution, and after filtration add the Spirit." *Lond.*

The iron oxidized by the combined action of air and moisture, unites with the excess of acid of the supertartrate; and a double salt is ultimately formed, consisting of pertartrate of iron and tartrate of potassa, which, together with a portion of undecomposed supertartrate of potassa, is dissolved in the distilled water. The preparation is, therefore, a solution of tartrate of iron and potassa and of cream of tartar, in dilute spirit intended to represent wine. It contains, according to Mr. Phillips, only sixteen grains of peroxide of iron in the pint, considerably less than might be inferred to be present from the quantity of iron employed. The deficiency is ascribed by Mr. Phillips to three causes; 1. the incomplete oxidation of the metal, of which a portion remains unchanged; 2. the drying of the tartrate of iron and potassa, by which it is rendered partly insoluble; and 3. the precipitation of a part of the salt from its aqueous solution, upon the addition of the spirit. The preparation is absurdly called Wine of Iron, as no wine enters into its composition. So far as regards the chalybeate ingredient, it closely resembles the old wine of iron, made by macerating iron wire or filings previously oxidized by air and moisture, in some acidulous wine, containing supertartrate of potassa, which formed the double tartrate with the oxidized iron. But as the proportion of this salt is variable in different wines, the preparation was necessarily of unequal strength, and has been discarded both from the U.S. and Dublin Pharmacopœias, in which it formerly held a place.* The London preparation might also be discarded, as, though more uniform than the former, it is an exceedingly feeble chalybeate, and is in no respect superior to an extemporaneous solution of the tartrate of iron and potassa.

Medical Properties and Uses. The wine of iron is too stimulating in proportion to its tonic power to be employed except in cases of considerable general debility, united with enfeebled digestion. The dose is from half a fluidounce to two fluidounces, two or three times a day. W.

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* The following is the formula for preparing Wine of Iron according to the former editions of the U.S. and Dublin Pharmacopœias. "Take of iron Wire, cut in pieces, *four ounces;* Wine [White Rhenish Wine, *Dub,*] *four pints.* Sprinkle the Wire with two pints of the Wine [a little of the Wine, *Dub.*] and expose it to the air till it is covered with rust, then add the rest of the Wine; macerate for ten days [digest for seven days, *Dub.*], with occasional agitation, and filter."

FERRI PHOSPHAS. *U. S. Phosphate of Iron.*

"Take of Sulphate of Iron *five ounces;* Phosphate of Soda *six ounces;* Water *a gallon.* Dissolve the Sulphate of Iron and Phosphate of Soda severally in four pints of the Water; then mix the solutions and set the mixture by that the powder may subside; lastly, having poured off the supernatant liquor, wash the Phosphate of Iron with hot water, and dry it with a gentle heat. *U. S.*

This preparation is the result of a double decomposition between the saline materials employed. The sulphuric acid combines with the soda and remains in solution as sulphate of soda; while the phosphoric acid, uniting with the protoxide of iron, falls as phosphate of iron. The amount of water directed is useful to ensure a prompt and complete mutual reaction of the two salts. If the ferruginous sulphate be a perfect protosulphate, the precipitate, as first thrown down, will be white; but it quickly absorbs oxygen and becomes bluish-white. It is in the form of an insoluble powder of a bright slate colour. According to Berzelius, it consists of a mixture of the protophosphate and perphosphate of iron.

Medical Properties and Uses. Phosphate of iron possesses the general properties of the ferruginous preparations, and has been given with advantage in amenorrhœa and some forms of dyspepsia. It was introduced into the U.S. Pharmacopœia, at the suggestion of Dr. Hewson of Philadelphia, who found it, after an extensive experience, to be a valuable chalybeate. The dose is from five to ten grains. B.

FERRI SULPHAS. *U. S., Lond. Dub.* SULPHAS FERRI. *Ed. Sulphate of Iron. Green Vitriol.*

"Take of Iron Wire, cut into pieces, Sulphuric Acid, each, *eight ounces;* Water *four pints.* To the Iron and Water, previously introduced into a glass vessel, add by degrees the Sulphuric Acid. When the effervescence shall have ceased, filter the solution through paper, and evaporate it so that crystals may form when it cools. Pour off the supernatant liquor, and dry the crystals upon bibulous paper." *U. S.*

The *London* process scarcely differs from the above, which was taken from it with slight alterations.

"Take of Purified Iron Filings *six ounces;* Sulphuric Acid *eight ounces;* Water *two pounds and a half.* Mix them, and when the effervescence is over, digest the mixture for some time on warm sand. Then filter the decanted liquor through paper, and after due evaporation, set it aside to crystallize." *Ed.*

"Take of Iron Wire *four parts;* Sulphuric Acid [Commercial?] *seven parts;* Water *sixty parts.* Dissolve the metal by the aid of heat, and filter the solution through paper. Lastly, after due evaporation, set aside the solution that crystals may form by slow refrigeration." *Dub.*

In these processes, a pure sulphate of the protoxide of iron is formed. Sulphuric acid, in a concentrated state, acts but imperfectly on iron; but when it is diluted, a vigorous action takes place, the oxygen of the water converts the metal into protoxide, with which the sulphuric acid unites, and hydrogen is evolved. The equivalent quantities for mutual reaction are 28 of iron to 49.1 of acid, which are the proportions taken by the Dublin College, and which were found to answer by Dr. Barker. In the other processes quoted, the iron is evidently in excess; but this is an error on the safe side, as it tends to secure the production of a perfect protosulphate, the portion of metal not dissolved being removed by the filtration. The quantity of water directed in the formulæ is sufficient to hold the salt in solution, and is necessary to enable the operator to comply with the direction to filter. A smaller quantity would be sufficient to form the salt, but would probably cause it to crystallize in mass, and thus interfere with the means of separating the impurities.

Sulphate of iron, under the name of *copperas*, is manufactured on a large scale, for the purposes of the arts, from the native sulphuret of iron, or pyrites, by roasting, oxidation by exposure to air and moisture, and lixiviation. The constituents of the mineral become sulphuric acid and protoxide of iron, which, by their union, form the salt in question. In this manner it is extensively manufactured at Stafford in Vermont, and at Cape Sable in Maryland. Sometimes, when the price of the product will justify it, our manufacturers of sulphuric acid make it from the unconcentrated acid, and scraps of old iron.

The sulphate of commerce is always impure, containing various foreign bodies, such as copper, zinc, alumina, magnesia, &c. Copper may be detected and separated by its deposition on an immersed polished plate of iron; but the other impurities are not easily got rid of. The commercial sulphate is, therefore, altogether unfit for medicinal employment, and should never be substituted by the apothecary for the officinal sulphate, which is made by the direct combination of its constituents, in order to ensure its purity.

Properties. Sulphate of iron is a bluish-green salt, having a disagreeable styptic taste, and an acid reaction. It crystallizes in oblique rhombic prisms, which, by exposure to the air, effloresce and absorb oxygen, and become, on the surface, first white, and afterwards yellow, passing gradually into the state of persulphate. It dissolves in twice its weight of cold, and in three-fourths of its weight of boiling water; but is insoluble in alcohol. When heated moderately it undergoes the watery fusion, and afterwards becomes dry and white; and at a red heat loses its acid and is converted into the red oxide of iron. (See *Sulphas Ferri Exsiccatus* and *Ferri Oxidum Rubrum.*) It is incompatible with the alkalies and their carbonates, soaps, lime-water, the muriates of lime and baryta, the borate and phosphate of soda, nitrate of silver, and the acetates of lead. It is also decomposed by astringent vegetable infusions, the tannin and gallic acid of which strike a black colour with the oxide of the sulphate; but how far this change may interfere with its medical activity is not well ascertained. It is composed of one equiv. of acid 40.1, one of protoxide 36, and six of water 54=130.1.

Medical Properties and Uses. Sulphate of iron is tonic and astringent. In large doses it is apt to produce nausea and vomiting, and griping of the bowels; and if its use be too long continued it injures the stomach. It has been recommended as a remedy for the scrofulous habit, conjoined with the extract of bark. In amenorrhœa with deficient action, it is frequently resorted to with advantage, either alone, or combined with the fetid and stimulant gums. It has also been given in diabetes. The dose is from one to five grains, in the form of pill. If given in solution, the water should be previously boiled to expel the air, which, if allowed to remain, would partially decompose the salt.

Off. Prep. Ferri Carbonas Præcipitatus, *U. S., Lond., Ed., Dub.;* Ferri Oxidum Rubrum, *U.S., Dub.;* Ferri Phosphas, *U. S.;* Mistura Ferri Composita, *U. S., Lond., Dub.;* Pilulæ Ferri Compositæ, *U. S., Lond., Dub.;* Pilulæ Sulphatis Ferri Compositæ, *Ed.;* Sulphas Ferri Exsiccatus, *Ed.;* Ferri Acetatis Tinctura, *Dub.;* Tinctura Acetatis Ferri cum Alcohol, *Dub.*

B.

SULPHAS FERRI EXSICCATUS. *Ed.* *Dried Sulphate of Iron.*

"Take of Sulphate of Iron *any quantity.* Expose it to a moderate heat in an unglazed earthen vessel, until it becomes white and perfectly dry." *Ed.*

This process is merely intended to deprive the salt of its water of crystallization, which amounts to 41.78 per cent. The heat should not exceed 212°, otherwise the salt itself would suffer decomposition. Dried sulphate of iron may be used internally in the form of pill, and is employed pharmaceutically by the Edinburgh College for making *Acidum Aceticum Forte,* and *Oxidum Ferri Rubrum,* which are its only officinal preparations. B.

FERRI SULPHURETUM. *U.S., Dub.* SULPHURETUM FERRI. *Ed.* *Sulphuret of Iron.*

"Take of Iron Filings *four ounces* [Purified, three parts, *Ed.*]; Sulphur *two ounces* [Sublimed Sulphur one part, *Ed.*]. Mix, and expose them, in a covered crucible, to an obscure red heat, till they unite." *U. S.*

"Expose a rod of Iron to the strongest heat of a forge, until it becomes white hot; and upon taking it from the fire, instantly apply it to a roll of sulphur. Receive the Sulphuret of Iron in water, separate it from the sulphur, and, having dried it, keep it in a well stopped bottle." *Dub.*

Iron combines with sulphur in two principal proportions, forming a protosulphuret and a sesquisulphuret, which are proportional, in composition, to the protoxide and sesquioxide (peroxide) of this metal. It is the protosulphuret that is formed in the processes given. In the first, which is the easier of the two, the iron, in a divided form and mixed with the sulphur, is made to unite with it by the application of heat. At a particular temperature the mixture suddenly becomes incandescent, when the heat may be withdrawn. The operation may be performed in a Florence flask, one-third filled with the mixture, and heated with a chafing dish. When thus prepared, the sulphuret is apt to be mixed with sesquisulphuret and metallic iron. The Dublin process furnishes a purer product, but is not so easy of execution. On the application of the roll of sulphur to the heated iron, which should be at a white heat in order that the experiment may succeed well, the metal appears to become hotter, burns with scintillations in the vapour of the sulphur, and forms instantly a protosulphuret, which being comparatively fusible, melts into globules, and drops into the water, which serves to extinguish them. The sulphuret thus obtained is stated by Berzelius to contain an excess of iron. The process recommended by him as the best, consists in heating, in a close vessel, a mixture of sulphur and the cuttings of thin sheet iron. At a full red heat, the iron burns in the gaseous sulphur, and becomes covered with a crust of the sulphuret. The heat is then maintained at redness until all excess of sulphur has been driven off. Upon the cooling of the vessel the pieces of iron are bent to and fro, which causes the superficial sulphuret to scale off.

Properties, &c. Sulphuret of iron has a yellowish colour and the metallic lustre. When pure it furnishes a yellow powder, and dissolves in dilute sulphuric or muriatic acid without leaving a residue of sulphur, and with the production of hydrosulphuric acid gas (sulphuretted hydrogen), free from admixture of hydrogen. It consists of one equiv. of sulphur 16.1, and one of iron 28=44.1. This preparation is employed in the Pharmacopœias for the production exclusively of hydrosulphuric acid gas, a necessary ingredient or agent in several formulæ. It may be made to yield this gas by the action of diluted sulphuric acid. During the reaction water is decomposed; its hydrogen combines with the sulphur to form the hydrosulphuric acid, while the oxygen converts the iron into protoxide, with which the sulphuric acid combines. *Hydrosulphuric acid* is a colourless gas, having a smell like that of putrid eggs. Its sp. gr. is 1.1782. It reddens litmus and saturates bases, with which it forms salts called *hydrosulphates* or *hydrosulphurets*. It is generated in the processes for the following preparations:—Acidum Hydrocyanicum, *U. S.* Liquor Ammoniæ Hydrosulphatis, *U. S.*, *Ed.*, *Dub.* Potassii Iodidum, *U. S.*, *Dub.* B.

FERRUM AMMONIATUM. *U. S.*, *Lond.* MURIAS AMMONIÆ ET FERRI. *Ed.* *Ammoniated Iron.*

"Take of Red Oxide of Iron, Muriate of Ammonia, each, *a pound.* Mix them well together, and sublime quickly by the application of a strong heat; then rub the sublimed matter into powder." *U. S.*

"Take of Subcarbonate of Iron [Precipitated Carbonate], Muriatic Acid, Muriate of Ammonia, each, *a pound.* Pour the Muriatic Acid upon the Subcarbonate of Iron, and set the mixture aside till it ceases to effervesce. Filter the solution through paper, and evaporate it to dryness. Mix the residue thoroughly with the Muriate of Ammonia; then sublime immediately with a hot fire; lastly, rub the sublimed matter into powder." *Lond.*

"Take of Red Oxide of Iron, washed and dried, Muriate of Ammonia, each, *equal weights.* Mix them thoroughly, and sublime with a quick fire. Rub the sublimate into powder, and keep it in a well stopped phial." *Ed.*

In the U.S. and Edinburgh processes, which are essentially the same, a portion of the muriate of ammonia is decomposed, the ammonia escaping, and the muriatic acid reacting upon the peroxide of iron, so as to form water and the perchloride of iron, the latter of which is sublimed with the undecomposed portion of the muriate of ammonia. In the London process, the permuriate of iron is first obtained, and this is sublimed in connexion with muriate of ammonia, assuming probably during the operation the form of perchloride of iron. The quantity of carbonate of iron directed by the London College is unnecessarily large, as little more than half of it is dissolved.

A more convenient mode of preparing the Ammoniated Iron is that of the Paris Codex, which directs that three parts of muriate of ammonia and one of muriate of iron be dissolved together in a sufficient quantity of water, and the solution evaporated to dryness with a moderate heat. The muriate of iron of the Paris Codex, is the protomuriate formed by the action of muriatic acid upon metallic iron, but the permuriate resulting from the action of the same acid on the officinal precipitated carbonate or red oxide is preferable, as it is less liable to chemical change.

Properties. Ammoniated iron, as usually found in the shops, is in crystalline grains, of a yellow colour, a feeble odour, and a styptic saline taste. In this form it is probably a mixture of muriate of ammonia and permuriate of iron, obtained by evaporating a solution of these salts. (*Phillips.*) Procured by sublimation it has an orange colour, and probably contains iron in the state of perchloride. In either form it is highly soluble and deliquescent, and requires to be kept in well stopped bottles. The proportion of the perchloride of iron to the muriate of ammonia, in the sublimed preparation, is very variable, but usually small.

Medical Properties and Uses. This preparation unites aperient properties with those belonging to the chalybeates generally, and is said to have been used with advantage in amenorrhœa, epilepsy, scrofula, rickets, &c.; but it is at best uncertain, and is now very seldom prescribed. It was formerly employed under the names of *flores martiales*, and *ens martis*. From four to twelve grains may be given in the form of pill, electuary, or solution, several times a day.

Off. Prep. Tinctura Ferri Ammoniati, *Lond.* W.

TINCTURA FERRI AMMONIATI. *Lond.* *Tincture of Ammoniated Iron.*

"Take of Ammoniated Iron *four ounces;* Proof Spirit *a pint.* Macerate and filter." *Lond.*

This is simply a solution of the preceding preparation in diluted alcohol. It is feeble and uncertain as a chalybeate, and has no particular claims to attention. W.

TINCTURA FERRI MURIATIS. *U.S.*, *Lond.* TINCTURA MURIATIS FERRI. *Ed.* MURIATIS FERRI LIQUOR. *Dub.* *Tincture of Muriate of Iron.*

"Take of Precipitated Carbonate of Iron *half a pound;* Muriatic Acid *a pint;* Alcohol *three pints.* Pour the Acid upon the Carbonate of Iron, in a glass vessel, and shake the mixture occasionally for three days; then set it by that the dregs, if there be any, may subside; lastly, pour off the liquor, and to this add the Alcohol." *U.S.*

The process of the *London College* is the original of the above, and differs from it only in the nomenclature.

"Take of Purified Black Oxide of Iron, in powder, *three ounces;* Muriatic Acid about *ten ounces*, or as much as may be sufficient to dissolve the Oxide. Digest with a gentle heat, and when the powder is dissolved, add as much Alcohol as will make the whole quantity of liquor amount to two pounds and a half." *Ed.*

"Take of Rust of Iron *one part;* Muriatic Acid, Rectified Spirit, each, *six parts.* Pour the Acid upon the Rust in a glass vessel, and shake the mixture occasionally for three days. Then set it by that the dregs may subside, and pour off the clear liquor. Evaporate this slowly to one-third, and when it is cold add the Spirit." *Dub.*

The precipitated carbonate of iron of the shops consists of the peroxide of iron, mixed with a variable, but always small proportion of the protocarbonate. When acted on by muriatic acid, as in the U.S. and London processes, it is dissolved with effervescence, in consequence of the escape of carbonic acid; and a solution of the permuriate of iron, with a little protomuriate, is obtained. When the muriatic acid employed is of the officinal strength (sp. gr. 1.160), it dissolves nearly all the precipitated carbonate, leaving behind, according to Mr. Phillips, less than one scruple, including accidental impurities. A reaction appears to take place between the muriatic acid and the alcohol, as the preparation has a decided ethereal odour. On exposure, the protoxide of iron of the protomuriate is converted by the absorption of oxygen into peroxide, which, requiring a larger proportion of acid than the former for its saturation, is partly precipitated. A slight excess of acid would, therefore, not be amiss, as the peroxide would thus be held in solution, and the preparation be of more uniform strength. The black oxide of iron, employed by the Edinburgh College instead of the precipitated carbonate, yields with the muriatic acid a larger proportion of the protomuriate; and the solution is, therefore, still more apt, upon exposure, to deposite peroxide, than that of the U.S. and London Pharmacopœias. The Dublin process is liable to the objection of a great waste of acid, of which much more is employed than is necessary to dissolve the quantity of rust of iron directed, the excess being driven off by heat. It is important that the apothecary should employ muriatic acid of the officinal specific gravity, as otherwise his preparation will be of uncertain strength. A want of attention to this circumstance is probably the cause that the tincture, as found in the shops, is very unequal. Of four specimens examined by Mr. Phillips, one contained in half a fluidounce 20 grains of peroxide of iron, another 12.1 grains, a third 11.3 grains, and the fourth only 9.3 grains. A specimen prepared by himself, precisely according to the directions of the London College, had the sp. gr. 0.994, and contained in half a fluidounce 16.8 grains of peroxide.

Properties. The tincture of muriate of iron is of a reddish-brown, somewhat yellowish colour, a sour and very styptic taste, and an odour resembling that of muriatic ether. The permuriate of iron, which is its chief constituent, is a deliquescent salt, of a dark orange colour, scarcely crystallizable, and consisting of one equiv. of peroxide of iron 80, and three equiv. of muriatic acid 109.26=189.26. The tincture is decomposed by the alkalies, alkaline earths, and their carbonates, astringent vegetable infusions, and the mucilage of gum Arabic, which are, therefore, incompatible with it in prescriptions.

Medical Properties and Uses. This is one of the most active and certain preparations of iron, usually acceptable to the stomach, and much employed for all the purposes to which the chalybeates generally are applied. It is particularly recommended as a tonic in scrofula, in which it is often given, conjointly with the solution of muriate of lime, or muriate of baryta. It has been employed also in gleets, and is said to be useful in dysury dependent on spasmodic stricture of the urethra, in the dose of ten drops repeated every ten minutes, till some effect is experienced. In hemorrhages from the uterus, kidneys, and bladder, it is thought to act advantageously, but should be confined to those of a passive character, or employed only after sufficient depletion. Externally it has sometimes proved useful in the destruction of venereal warts, and as a styptic in cancerous and fungous ulcers. The dose is from ten to thirty minims, which may be gradually increased to one, or even two fluidrachms, two or three times a day. It is given diluted with water. W.

LIQUOR FERRI ALKALINI. *Lond.* *Solution of Alkaline Iron.*

"Take of Iron *two drachms and a half;* Nitric Acid *two fluidounces;* Distilled Water *six fluidounces;* Solution of Subcarbonate of Potassa *six fluidounces.* Pour the Acid and Water, previously mixed together, upon the Iron; then, after the cessation of effervescence, pour off the acid solution. Add this gradually and at intervals to the Solution of Subcarbonate of Potassa, occasionally stirring, until the liquor, having assumed a red-brown colour, ceases to effervesce. Lastly, set it aside for six hours, and pour off the solution." *Lond.*

In the first step of this process, the iron, by the decomposition of a portion of the nitric acid, is converted into the peroxide, which unites with a part of the undecomposed acid to form the pernitrate of iron, while nitric oxide gas escapes with effervescence, assuming the form of red fumes on contact with the air. A reddish-brown solution of pernitrate of iron is thus obtained, with a considerable excess of nitric acid. When this is added to the solution of carbonate of potassa, the free nitric acid, as well as that of the salt of iron, combines with the potassa to form nitre, carbonic acid escapes with effervescence, and the peroxide of iron is precipitated for a moment, to be again dissolved by the excess of the alkaline carbonate. From the liquor thus prepared, when allowed to stand, most of the nitrate of potassa separates in a spongy mass of crystals, from which the liquor is poured off.

Properties. This solution has a deep red colour, and an alkaline styptic, saline taste. It contains nitrate of potassa, carbonate of potassa, and peroxide of iron; but in what precise mode these are combined has not been ascertained. Upon the addition of water it lets fall the peroxide of iron; and alcohol separates all the solid ingredients. So loosely are its constituents held together, that, according to Dr. Paris, it cannot be administered in any form without undergoing decomposition. It is an inelegant preparation, without any superiority as a chalybeate to counterbalance its inconveniences; and might very properly be discarded from the London Pharmacopœia.

Medical Properties. The solution of alkaline iron, or, as it might be more appropriately called, the alkaline solution of iron, has the general properties of the chalybeates united with those of an antacid. It is, we believe, never employed in this country. The dose is from thirty minims to a fluidrachm. W.

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GUMMI-RESINÆ.

Gum-resins.

These are concrete natural juices of plants, obtained by spontaneous exudation or incision, and consisting of gum and resin, associated for the most part with more or less essential oil, and frequently with other substances, such as extractive, bassorin, starch, wax, and various salts. The gum and resin are essential ingredients, but exist in very different proportions in the different varieties. All the gum-resins are partially soluble in alcohol and in water, but completely so in neither of these liquids. Diluted alcohol, on the contrary, dissolves them almost entirely, especially if assisted by heat. With water they form an opaque emulsion; the resin, essential oil, and other insoluble constituents being held in suspension by the dissolved gum.

The *London College* gives the following directions in relation to the gum-resins.*

"Those Gum-resins are to be preferred, which may be chosen so perfect as not to require purification. But if they do not appear to be sufficiently pure, boil them in water until they soften, and express them through a hempen cloth; then set them by that the resinous part may subside. Pour off the supernatant liquid, and evaporate it by means of a water-bath, adding, towards the end of the process, the resinous portion, so as to incorporate it with the gum.

"The Gum-resins which melt easily, may be purified by putting them into an ox bladder, and holding them in boiling water, until they become so soft as to be capable of being separated from their impurities by expression through a hempen cloth."

The first of these processes is applicable to the gum-resins only when they are intended for external use; for the essential oil, upon which their medicinal virtues often in great measure depend, is more or less dissipated by the heat employed. The latter process is preferable whenever practicable, as it affects less the character of the medicine; but several of the gum-resins, such as assafetida and ammoniac, are not sufficiently fusible at the temperature of boiling water to admit of being strained with facility. It is always best to select those intended for internal exhibition, of such a quality as not to require purification. As they are usually brittle and pulverizable when very cold, they may be freed from the coarser impurities by powdering them in the winter season, and sifting the powder, which afterwards agglutinates with warmth. This plan is recommended by Mr. Brande, in relation to assafetida, ammoniac, and galbanum. The French pharmaceutists purify the gum-resins by dissolving them in diluted alcohol, filtering and evaporating the solution. This process, though liable in a still greater degree than that of the London College to the objection of diminishing the virtues of the medicine by driving off the essential oil, has the advantage of completely separating all insoluble substances, however minutely divided, such as fine sand or other earth, which might pass through the pores of a hempen strainer. W.

HYDRARGYRUM.

Preparations of Mercury.

HYDRARGYRUM PURIFICATUM. *U.S., Lond., Dub.* HYDRARGYRUS PURIFICATUS. *Ed. Purified Mercury.*

"Take of Mercury *any quantity*. Pour it into an iron retort, and having applied heat, distil the Purified Mercury." *U. S., Lond.*

"Take of Mercury *six parts;* Iron Filings *one part*. Rub them together, and distil from an iron vessel." *Ed.*

"Take of Mercury *six parts*. Draw off *four parts* by slow distillation." *Dub.*

The mercury of commerce is usuaally very pure; but occasionally it contains foreign metals, such as lead, tin, zinc, and bismuth, and hence the Pharmacopœias direct its purification. Mercury being much more volatile than the contaminating metals, rises first in distillation, while they are left behind. But it is necessary to avoid pushing the distillation too far; for in that event, some of the foreign metals, particularly bismuth, are apt to be carried over. The Dublin Pharmacopœia, on account of this danger, directs only two-thirds of the mercury to be drawn over; while the other Pharmacopœias distil the whole. The iron filings directed by the Edinburgh College appear to be useless, as they have no affinity for the contaminating metals. Considering the difficulty of purifying mercury by distillation, it is better for the manufacturing chemist to purchase pure samples of the metal, which may be always had in the market, and thus supersede the necessity of this process.

Properties, &c. Mercury is known to be pure when it is bright and perfectly mobile. Its freedom from foreign metals may be ascertained by the negative indications of the tests mentioned under *Hydrargyrum*. Purified mercury is used in all the preparations of mercury requiring the metal, except the mercurial plaster of our Pharmacopœia, in which the unpurified metal is employed. B.

HYDRARGYRI ACETAS. *Dub.* ACETAS HYDRARGYRI. *Ed. Acetate of Mercury.*

"Take of Purified Mercury, Acetate of Potassa, each, *nine parts;* Diluted Nitric Acid *eleven parts;* boiling Distilled Water *one hundred parts;* Distilled Vinegar *a sufficient quantity*. Add the Nitric Acid to the Mercury, and when the effervescence shall have ceased, digest the mixture, so as to dissolve the metal. Dissolve the Acetate of Potassa in the Water, and add Distilled Vinegar until acidity predominates in the solution. To this, boiling hot, add the solution of the Mercury in the Nitric Acid, and strain the mixture quickly through a double linen cloth; then let it cool that crystals may form. Wash these with cold Distilled Water, and dry them on paper with a very gentle heat. In every step of this process, glass vessels are to be used." *Dub.*

The *Edinburgh College* orders *three ounces* of purified mercury, *four ounces and a half* of diluted nitrous acid, or a little more than sufficient to dissolve the mercury, *three ounces* of acetate of potassa, and *eight pounds* of boiling water, and treats the materials in a similar manner to the above, merely omitting to acidulate with distilled vinegar, and to strain through linen.

The object of these processes is to obtain an acetate of the protoxide of mercury. By the solution of mercury in diluted nitric acid, in the proportions indicated, a protonitrate is formed; and this, when added to the boiling solution of acetate of potassa, causes a double decomposition, resulting in the formation of nitrate of potassa, which remains in solution, and protacetate of mercury, which precipitates in crystals as the solution cools. The nitric acid is used diluted in order to avoid peroxidizing the metal; and for the same reason heat is not applied until the action of the acid has ceased in the cold, and then only moderately. Notwithstanding every precaution, it is very difficult to get a perfect protonitrate of mercury; and as water throws down a yellow subnitrate from the pernitrate if the solutions be neutral, the Dublin College orders the solution of the acetate of potassa to be acidulated with distilled vinegar, which effectually prevents this precipitation. The same object is gained in the Edinburgh formula, by using a slight excess of nitric acid for dissolving the mercury. The straining of the solution while hot, as directed by the Dublin College, is intended to separate any subnitrate which may be accidentally formed. As the crystals of the acetate of mercury may be contaminated with a little pernitrate, which is rendered yellow by the action of water, some authorities recommend that the washing should be performed with water acidulated with a little distilled vinegar. The drying of the crystals is an operation which requires great care, as a slight heat is sufficient to decompose them. On this account it has been proposed to dry them by compression between the folds of bibulous paper.

Properties, &c. Acetate of mercury is a white salt, in the form of thin elastic scales of a silvery lustre. Its taste is very disagreeable, but less so than that of most of the other soluble salts of mercury. Air has no effect on it, but it contracts a brown tinge by exposure to light. It is insoluble in alcohol, but dissolves readily, with partial decomposition, in boiling water, from which, being only sparingly soluble in cold water, it precipitates in crystals on cooling. When a perfect protacetate, alkalies throw down from its solution a black precipitate of protoxide; but if it be contaminated with peracetate, the same reagents cause a yellowish precipitate. It consists of one equiv. of acetic acid 51.48, one of protoxide of mercury 210, and four of water 36=297.48.

Medical Properties. Acetate of mercury was introduced into regular practice in consequence of its having been ascertained to be the active ingredient in Keyser's pills, which were at one time esteemed to be a mild and safe antisyphilitic remedy, and the mode of preparing which was purchased and made public by the French government. These pills, however, are very unequal in their operation; and it is the opinion of M. Garot, that their occasional violence is attributable to their containing the peracetate instead of the protacetate of mercury. The officinal acetate is intended to be a protacetate; but even in this state it possesses no peculiar powers which give it advantages over other mercurials in the treatment of syphilis; and it is at present very little used. The dose is a grain, given in the form of pill, twice a day. It is occasionally used as an external application to cutaneous eruptions, in the proportion of a grain dissolved in a fluidounce of rose-water. B.

HYDRARGYRI CHLORIDUM CORROSIVUM. *U.S.* HYDRARGYRI OXYMURIAS. *Lond.* MURIAS HYDRARGYRI CORROSIVUS. *Ed.* HYDRARGYRI MURIAS CORROSIVUM. *Dub.* *Corrosive Chloride of Mercury. Corrosive Sublimate.*

"Take of Purified Mercury *two pounds;* Sulphuric Acid *thirty ounces;* Chloride of Sodium *four pounds.* Boil the Mercury with the Sulphuric Acid, in a glass vessel, until the sulphate of mercury is left dry. Rub this, when cold, with the Chloride of Sodium, in an earthenware mortar; then sublime in a glass cucurbit, with a gradually increasing heat." *U.S.*

The London and Edinburgh processes agree with the above in the proportions of the materials employed; and only differ from it slightly in phraseology.

"Take of Persulphate of Mercury *five parts;* dried Muriate of Soda *two parts.* Rub them well together in an earthenware mortar, so as to reduce them to a very fine powder. Then, with a heat gradually raised, sublime the Corrosive Muriate of Mercury into a proper receiver." *Dub.*

In order to understand the above processes, which are the same in principle, it is necessary to premise, that corrosive sublimate is a bi-chloride of mercury, consisting of two equiv. of chlorine and one of mercury. By boiling sulphuric acid on mercury to dryness, as directed in the first process, a white salt is formed, which is a bisulphate of the peroxide of mercury. (See *Hydrargyri Persulphas*, Dub.) When this is mixed with chloride of sodium (common salt), and the mixture exposed to a subliming heat, a mutual decomposition takes place; the chlorine of the common salt combines with the mercury, and sublimes as bichloride of mercury, while the sodium, oxygen of the peroxide of mercury, and sulphuric acid unite to form sulphate of soda, which remains behind. The quantities for mutual decomposition are two equiv. of chloride of sodium 117.44, consisting of two equiv. of chlorine 70.84, and two equiv. of sodium 46.6; and one equiv. of the bisulphate of the peroxide of mercury, consisting of one equiv. of mercury 202, two equiv. of oxygen 16, and two equiv. of sulphuric acid 80.2. The two equiv. of chlorine combine with the one equiv. of mercury, to form one equiv. of corrosive sublimate 272.84, and the two equiv. severally, of sodium, oxygen, and sulphuric acid, by their union, form two equiv. of dry sulphate of soda 142.8. In the U.S. formula, quoted above, a large excess of common salt is directed. It may be desirable to have a slight excess of the salt; but so large a redundancy has no power of increasing the product of corrosive sublimate, as was ascertained experimentally by Dr. Barker of Dublin.

The Dublin formula for corrosive sublimate is peculiar in ordering the bisulphate of the peroxide of mercury ready formed, instead of preparing it as the first step of the process, as is done in the processes of the other Pharmacopœias.

As the British Colleges adopt the old theory of the nature of common salt and corrosive sublimate, namely that they are *muriates*, it may be well to explain the formation of the latter on that theory. According to the old theory, the reaction takes place between two equiv. of muriate of soda, and one equiv. of bisulphate of mercury. The two equiv. of soda combine with the two equiv. of sulphuric acid to form two equiv. of sulphate of soda; while the two equiv. of dry muriatic acid sublime in union with the one equiv. of peroxide of mercury, to form the *bi*muriate of the *per*oxide—the corrosive muriate of the British Pharmacopœias. Thus, while the new theory makes corrosive sublimate a bichloride of mercury, the old one considers it a bipermuriate. According to both views, the compound has the same equivalent number, and consists of one equiv. of mercury, combined with the same quantity of matter. This matter is considered, according to the new theory, to consist of two equiv. of a simple body, called chlorine, but according to the old, of two equiv. of an imaginary body called *dry* muriatic acid, and two equiv. of oxygen.

Considering the fact that the chloridic theory is now fully established, and that the old theory is not advocated by a single chemist of note, it is remarkable that the British Colleges have still adhered to the latter, and misnamed their chlorides of mercury. The U.S. Convention, in the revision of our Pharmacopœia, in 1830, avoided this error, by adopting a correct nomenclature for these compounds. In the instance of the substance under consideration, it is correctly called a *chloride*, while its deleterious nature is sufficiently marked by the adjunct "*corrosivum*," an epithet which has served to distinguish it from an early period.

Preparation on the Large Scale, &c. According to Mr. Brande, the following proportions are employed at Apothecaries' Hall, London:—"50 lbs. of mercury are boiled to dryness with 70 lbs. of sulphuric acid: 73 lbs. of bipersulphate of mercury are thus formed, which, being perfectly mixed with 120 lbs. of common salt, and sublimed, yield from 63 to 65 lbs. of corrosive sublimate." It is sometimes useful to a physician to know how to make a small portion of corrosive sublimate on an emergency. This may be done by dissolving peroxide of mercury (red precipitate) in muriatic acid, evaporating the solution to dryness, dissolving the dry mass in water, and crystallizing. At first a bimuriate of the peroxide is formed in solution, which, by crystallizing, loses the elements of water, and becomes the bichloride.

Properties. Corrosive chloride of mercury, as obtained by sublimation, is in the form of white, semitransparent, ponderous masses, of the sp. gr. 5.2, permanent in the air, and possessing an exceedingly acrid, styptic, and durable taste. It dissolves in sixteen parts of cold water, and in three of boiling water. A boiling saturated solution, upon cooling, lets it fall in a confused mass of crystals. By solution, it may be considered as converted, by the decomposition of two equiv. of water, into a bimuriate of the peroxide. It is soluble also in two and a third parts of cold alcohol, in about its own weight of boiling alcohol, and in three parts of ether. Sulphuric, nitric, and muriatic acids dissolve it without alteration. When heated it melts, and readily sublimes in dense, white, acrid vapours, which condense, on cool surfaces, in white, shining needles. Its aqueous solution renders green the syrup of violets, and is precipitated brick-red, becoming yellow, by the fixed alkalies and alkaline earths, and white by ammonia. (See *Hydrargyrum Ammoniatum.*) The former precipitate is a hydrated peroxide of mercury, and is formed in the process for preparing the *aqua phagedænica* of old pharmacy, which is obtained by dissolving a drachm of corrosive sublimate in a pint of lime-water. Corrosive sublimate forms with muriate of ammonia and chloride of sodium, compounds which are more soluble than the uncombined mercurial salt. It is on this account that aqueous solutions of sal ammoniac, or of common salt, dissolve much more corrosive sublimate than simple water. The combination of corrosive sublimate with muriate of ammonia was formerly called *sal alembroth*, or *salt of wisdom*.

Corrosive sublimate has the property of retarding putrefaction in a remarkable degree. Animal matters, immersed in its solution, shrink, acquire firmness, assume a white colour, and become imputrescible. It is on account of this property that it is often usefully resorted to for the preservation of anatomical preparations.

Tests of Purity and Incompatibles. Pure corrosive chloride of mercury sublimes, when heated, without residue; and consequently, if a portion of a sample should not evaporate entirely, the presence of some impurity is proved. If calomel be present, it may be detected by its insolubility in water. Corrosive sublimate is incompatible with many of the metals, with the alkalies and their carbonates, with soap, lime-water, tartar emetic, nitrate of silver, the acetates of lead, the sulphurets of potassa and soda, and all the hydrosulphates. It is also decomposed by many vegetable and some animal substances, and in most cases is converted by them into protochloride of mercury or calomel. According to Dr. Thomson (London Dispensatory), it produces precipitates in infusions or decoctions of the following vegetable substances;—chamomile, horse-radish, columbo, catechu, cinchona, rhubarb, senna, simaruba, and oak-bark. B.

Medical Properties and Uses. Corrosive sublimate is the most powerful of the mercurial preparations, operating quickly on the system, and, if not properly regulated, producing very violent effects. It is less apt to salivate than most other mercurials. In minute doses properly repeated, it exerts its peculiar influence without any obvious alteration of the vital functions, except, perhaps, a slight increase in the frequency of the pulse, and in the secretions from the skin and kidneys. Sometimes, however, it purges; but this effect may be obviated by combining it with a little opium. In larger doses it occasions nausea, vomiting, griping pain in the bowels, diarrhœa, and other symptoms of gastric and intestinal irritation; and in still larger quantities produces all the effects of a violent corrosive poison. It has long been used as a remedy in syphilis, in all stages of which it is highly recommended by some authors. It is said to remove the symptoms more speedily than other mercurials, while its action is less unpleasant, as the mouth is less liable to be made sore. For the latter reason it is much employed by empyrics, and is an ingredient in almost all those nostrums which have at various periods gained a temporary popularity as antivenereals. But while it is extolled by some authors, others, among whom is Mr. Pearson of London, deny its extraordinary merits, and maintain that, though occasionally useful in arresting the progress of the complaint, particularly in the secondary stage, it does not produce permanent cures, and, in the primary stage, often fails altogether. The general opinion at present is in favour of its employment in secondary syphilis, and there can be no doubt that it occasionally does much good. It is also used advantageously in cutaneous diseases of a leprous character, and in obstinate chronic rheumatism. It is usually associated with alterative or diaphoretic medicines, such as the antimonials, and the compound decoction or syrup of sarsaparilla; and, in order to obviate the irritation it is apt to produce, it may often be advantageously united with opium, or extract of hemlock. There is no doubt that many of the substances in connexion with which it is employed, alter its chemical condition; but it does not follow that even in its altered state it may not be very useful as a remedy.

As an external remedy, corrosive sublimate is stimulant and escharotic. A very weak solution in water, containing from an eighth to half a grain in the fluidounce, is employed as an injection in gleet, as a gargle in venereal sorethroat, and as acollyrium in chronic venereal ophthalmia. A stronger solution, containing one or two grains in the fluidounce, is a very efficacious wash in lepra, and other scaly cutaneous eruptions. Dissolved in water, in the proportion of five or ten grains to the fluidounce, it may be used with much benefit in venereal ulcers of the throat, to which it should be applied by means of a camel's hair pencil. With lime-water it forms the *aqua phagedænica* of the older writers, employed as a wash in ill-conditioned ulcers. The powdered chloride has been used as an escharotic; but is, in general, inferior to nitrate of silver or caustic potassa. In *onychia maligna*, however, it is employed with great advantage, mixed with an equal weight of sulphate of zinc, and sprinkled thickly upon the surface of the ulcer, which is then to be covered with a pledget of lint saturated with tincture of myrrh. The whole diseased surface is thus removed, and the necessity of resorting to the knife is avoided. This practice was first introduced, we believe, by Dr. Perkins of Philadelphia, and is highly recommended by Dr. Physick. We have employed it in several instances with complete success.

The dose of corrosive sublimate is from an eighth to a quarter of a grain, repeated three or four times a day, and given in pill, or dissolved in water or spirit. The pill, which is the preferable form, is usually prepared with crumb of bread, and care should be taken that the medicine be equally diffused through the pilular mass, before it is divided. Mucilaginous drinks are usually given to obviate the irritating effects of the medicine.

Toxicological Properties. Swallowed in poisonous doses, it produces a sense of burning heat in the throat, excruciating pain in the stomach and bowels, excessive thirst, anxiety, nausea and frequent retching with vomiting of bloody mucus, diarrhœa and sometimes bloody stools, small and frequent pulse, cold sweats, general debility, difficult respiration, cramps in the extremities, faintings, insensibility, convulsions, and death. The mucous membrane of the stomach exhibits on dissection all the signs which mark the action of a violent corrosive poison. In the treatment of a case of poisoning by corrosive sublimate, Orfila recommends the free use of the whites of eggs beat up with water. The albumen of the eggs decomposes the corrosive sublimate; and the liquid by its bulk dilutes the poison, and distends the stomach so as to produce vomiting. The insoluble substance formed by the reaction of albumen upon corrosive sublimate, which has usually been thought to consist of albumen and calomel, has been proved by Rose to be a compouud of albumen and oxide of mercury. (*Turner.*) If eggs cannot be procured, wheat flour mixed with water may be substituted, gluten having, according to M. Taddei, the same effect as albumen. Should neither of these antidotes be at hand, mucilaginous drinks should be largely administered; and in any event, the patient should be made to drink copiously, so long as vomiting continues, or till the symptoms are relieved. Should he be unable to vomit, the stomach should be washed out by means of the stomach pump. The consecutive inflammation should be treated with general or local bleeding, fomentations, and cooling mucilaginous drinks, and the attendant nervous symptoms be alleviated by opiates. W.

Tests for Corrosive Sublimate. On account of the extreme virulence of this chloride as a poison, the reagents by which it may be detected form a subject of inquiry of the utmost importance, as connected with medico-legal investigations. The best tests for it, according to Dr. Christison, are hydrosulphuric acid gas (sulphuretted hydrogen), hydriodate of potassa, protochloride of tin, and nitrate of silver. A stream of hydrosulphuric acid transmitted through a solution of corrosive sublimate, produces a black precipitate of sulphuret of mercury, and acts as a very delicate test. A solution of hydriodate of potassa produces a very characteristic pale scarlet precipitate of biniodide of mercury. Protochloride of tin causes at first a white, and afterwards a grayish-black precipitate, and, as a test, is not liable to any fallacy. Nitrate of silver causes a heavy white precipitate of chloride of silver, which darkens by exposure to light. This test detects the chlorine of the corrosive sublimate, and serves to determine, after the other reagents have detected the mercury, by what means the metal is held in solution. In addition to these tests, the following may be mentioned. *Lime-water* throws down a yellow precipitate of peroxide. *Ammonia* produces a fine white flocculent precipitate. *Ferrocyanate of potassa* gives rise to a white precipitate, becoming slowly yellowish, and at length a pale blue. *A bright plate of copper* immersed in the solution is instantly tarnished, and after the lapse of half an hour becomes covered with a grayish-white powder. Lastly, *a polished piece of gold*, moistened with the mercurial solution, and touched, through the liquid, with a piece of iron, becomes silvery white. This test, which was proposed by Mr. Sylvester and simplified by Dr. Paris, is conveniently applied by moistening a gold ring with the suspected solution, and touching the ring through the moistened spot with the point of a penknife. The object of the iron is to form with the gold a simple galvanic circle, which enables the latter metal to precipitate the mercury on its surface.

By the combined indications of the foregoing tests, corrosive sublimate may be infallibly detected; unless it exists in very minute quantity, associated with organic substances, by which its presence is often greatly obscured. When it exists in organic mixtures, made by boiling the contents or substance of the stomach in distilled water, Dr. Christison recommends that a preliminary trial be made, with the protochloride of tin, on a small portion filtered for the purpose. If this causes a grayish-black colour, he shakes the mixture, as recommended by Orfila, with a fourth of its bulk of sulphuric ether, which dissolves the chloride and rises to the surface. The ethereal solution is then evaporated to dryness, and the dry salt obtained is dissolved in hot water, whereby a pure solution is procured, in which the corrosive sublimate may be readily detected by the ordinary tests. If the trial test should produce a light gray colour, the chloride is indicated in still less quantity, and Dr. Christison recommends to proceed in the following manner. Treat the unfiltered mixture with protochloride of tin, as long as any precipitate is formed, which will have a slate-gray colour. Collect, wash, and drain it on a filter, and, having removed it without being dried, boil it, in a glass flask, in a moderately strong solution of caustic potassa, until all the lumps disappear. The alkali will dissolve all animal and vegetable matter, and on allowing the solution to remain at rest, a heavy grayish-black powder will subside, which consists chiefly of metallic mercury, and in which small globules of the metal may sometimes be discovered, either by the naked eye, or by the aid of a magnifier. For further details, see *Christison on Poisons*, 2d. edit. Edinburgh, 1832.

Off. Prep. Hydrargyrum Ammoniatum, *U. S.*, *Lond.*, *Dub.;* Liquor Hydrargyri Oxymuriatis, *Lond.;* Sub-Murias Hydrargyri Mitis. *Ed.* B.

LIQUOR HYDRARGYRI OXYMURIATIS. *Lond.* *Solution of Oxymuriate of Mercury.*

"Take of Oxymuriate of Mercury [Corrosive Sublimate] *eight grains;* Distilled Water *fifteen fluidounces;* Rectified Spirit *a fluidounce.* Dissolve the Oxymuriate of Mercury in the Distilled Water, and add the Spirit to it." *Lond.*

This solution was intended to facilitate the dispensing of corrosive sublimate in small doses. On exposure to light it suffers decomposition, calomel being deposited, and free muriatic and chloric acids formed in the water. According to Dr. Davy, the decomposition is accelerated by the addition of a small quantity of alcohol; so that the formula of the London College is not judicious. Mr. Brande states, that the decomposition is entirely prevented by the presence of muriate of ammonia, or common salt, and recommends the addition of eight grains of the former to the officinal solution. The dose of the solution, of which a fluidounce contains half a grain of corrosive sublimate, is from one to four fluidrachms taken in flaxseed tea. W.

HYDRARGYRI CHLORIDUM MITE. *U.S.* HYDRARGYRI SUBMURIAS. *Lond.* SUB-MURIAS HYDRARGYRI MITIS, sive CALOMELAS. *Ed.* CALOMELAS SUBLIMATUM. *Dub.* *Mild Chloride of Mercury. Submuriate of Mercury. Calomel.*

"Take of Purified Mercury *four pounds;* Sulphuric Acid, *thirty ounces;* Chloride of Sodium *a pound and a half.* Boil two pounds of the Mercury with the Sulphuric Acid, in a glass vessel, till the sulphate of mercury is left dry. Rub this, when cold, with the remainder of the Mercury, in an earthenware mortar, so that they may be thoroughly mixed. Then add the Chloride of Sodium, and rub it with the other ingredients, till all the globules disappear; afterwards sublime. Reduce the sublimed matter to a very fine powder, pass it through a sieve, and wash it frequently with boiling distilled water, till this affords no precipitate upon the addition of water of ammonia. Lastly, prepare the powder in the manner directed for the carbonate of lime." *U. S.*

The *London* formula is the same with the above, except that the powdered sublimed matter is directed to be agitated with a solution of eight ounces of muriate of ammonia in a gallon of boiling distilled water, before it is washed with pure water.

"Take of Muriate of Mercury [Corrosive Sublimate] *four parts;* Purified Mercury *three parts.* Rub the muriate into a fine powder, in a glass mortar, with a little water to prevent the acrid powder from rising; then add the Mercury, and rub again, until the metal is extinguished. Dry the matter, and having put it in an oblong phial, of which it should fill only one-third, sublime from warm sand. Reduce the sublimate to powder, and sublime it a second time; then rub it into a very fine powder, and lastly, wash it with boiling distilled water." *Ed.*

"Take of Persulphate of Mercury *twenty-five parts;* Purified Mercury *seventeen parts;* Dried Muriate of Soda *ten parts.* Triturate together the Persulphate of Mercury and Purified Mercury, in an earthenware mortar, until the metallic globules completely disappear. Then add the dried Muriate of Soda and mix them well; and from a suitable vessel, with a heat gradually raised, sublime the mixture into a receiver. Reduce the sublimate to powder, and wash it with water so long as the decanted liquid is precipitated by Water of Caustic Potassa. Lastly, dry the Sublimed Calomel." *Dub.*

The object of the above processes is to obtain a protochloride of mercury. This chloride consists of one equiv. of chlorine, and one of mercury, and consequently contains precisely half as much chlorine as corrosive sublimate, combined with the same quantity of mercury. In the process of the U.S. Pharmacopœia, as in the case of corrosive sublimate, a bisulphate of the peroxide is first formed; but instead of being immediately sublimed with the chloride of sodium (common salt,) it undergoes a preparatory trituration with the same quantity of mercury as was employed in forming it. This trituration may be conceived to take place between one equiv. of the *bisul-*

phate of the peroxide, and one equiv. of metallic mercury, which are converted into two equivalents of the *neutral* sulphate of the protoxide. This change will be easily understood, by adverting to the fact, that the bisulphate of the peroxide consists of two equiv. of sulphuric acid, two of oxygen, and one of mercury, and when rubbed up with one equiv. of additional mercury, the whole matter present becomes two equiv. of acid, two of oxygen, and two of mercury, evidently corresponding to two equiv. of the neutral protosulphate. The two equiv. of protosulphate thus formed, being heated with two equiv. of common salt, the two equiv. of chlorine in the latter sublime in union with the two equiv. of mercury in the former, and generate two equiv. of protochloride of mercury; while the two equiv. severally, of sulphuric acid, oxygen, and sodium, unite together to form two equiv. of dry sulphate of soda, which remains as a fixed residue. It is hence apparent, that the residue in this process is the same as in the ordinary process for corrosive sublimate.

Some writers explain the above process differently. Thus it is alleged that the trituration cannot reasonably be supposed chemically to unite metallic mercury with the bipersulphate, so as to convert it into protosulphate; and hence the process has been considered as one in which the materials for generating corrosive sublimate are sublimed in a state of intimate mixture with metallic mercury. According to this view, corrosive sublimate is first formed, and rising by the heat simultaneously with the mercury, unites with the metal and forms the calomel.

The calomel in mass as sublimed, is liable to contain a little corrosive sublimate; and hence the necessity of the directions of the U.S. Pharmacopœia, to reduce the sublimed matter to a very fine powder, and to wash it with boiling distilled water until liquid ammonia produces no precipitate in the water. The ammonia occasions a white precipitate so long as the washings contain corrosive sublimate; and when it ceases to produce this effect, the operator may rest satisfied that the whole of the poisonous salt has been removed. The direction of the London College, that the washing should first be performed with a hot solution of muriate of ammonia is improper; for while this muriate has the power of rendering corrosive sublimate more soluble, it has been shown by Mr. Hennel of London, to have the property also, when in hot solution, of converting a portion of the calomel itself into corrosive sublimate.

The *Edinburgh* process for calomel is peculiar in directing the sublimation of a mixture of corrosive sublimate and mercury, and the mode in which it is formed is thus explained. One equiv. of corrosive sublimate consists of two equiv. of chlorine and one of mercury. When rubbed up with one equiv. of metallic mercury and sublimed, the whole becomes two equiv. of chlorine and two of mercury; that is, two equiv. of calomel. The proportions employed are nearly those of the equivalents, giving merely a slight excess of mercury.

The process of the *Dublin* College is in effect the same as that of the U.S. and London Pharmacopœias; the only difference being, that in the former the bipersulphate of mercury is used ready formed, as prepared by a distinct formula of the Dublin Pharmacopœia, instead of being made as the first step of the process itself. The Dublin College does not direct that the water employed for washing the calomel should be hot. This omission renders the directions somewhat incomplete; for it is obviously preferable to wash with boiling water. The water of caustic potassa with which the washings are tested, is intended to detect corrosive sublimate, and will cause a yellow cloud as long as this salt is present in them. The proportions employed are nearly the equivalent quantities.

Of the different processes here commented upon, those of the U.S. and Dublin Pharmacopœias are obviously the best. The London process, though the same in principle, is liable to the objection of using, needlessly if not injuriously, a hot solution of muriate of ammonia; and the Edinburgh formula is expensive, as implying the previous preparation of corrosive sublimate. The chemical changes which take place may be readily explained on the old theory of muriatic acid, which has been sanctioned by the nomenclature adopted by the British Colleges. By this theory, calomel is a *neutral** muriate of the *prot*oxide of mercury. When it is generated according to the first plan mentioned in this article (*U. S.*, *Lond.*, and *Dub.* process), it becomes formed in consequence of a double decomposition between the protosulphate of mercury and muriate of soda (common salt), which results in the generation of neutral protomuriate of mercury (calomel), and sulphate of soda. When formed according to the second plan (*Edinburgh* process), one equiv. of *bi*muriate of the *per*oxide of mercury (corrosive sublimate), is triturated with one equiv. of metallic mercury, and made to unite with it by sublimation. The whole, after combination, is evidently two equiv. of muriatic acid, two of oxygen, and two of mercury, which correspond precisely with two equiv. of the neutral protomuriate, or calomel. From these explanations it becomes apparent, that the difference, according to the old theory, between the mercurial chlorides, is not merely that the base of calomel is a protoxide, while that of corrosive sublimate is a peroxide; but also that the base of the latter is combined with twice as much muriatic acid as is united with the base of the former. According even to the old theory, therefore, calomel is not a *sub*muriate, as it is called by the London and Edinburgh Colleges; although, on the erroneous assumption that corrosive sublimate is the *neutral* muriate, the name is defensible as relatively correct, in allusion to the fact that calomel contains only half as much muriatic acid combined with the base.

Preparation on the Large Scale. The process for making calomel by means of the bipersulphate of mercury, was originally practised at Apothecaries' Hall, London. The proportions taken, and the mode of proceeding, in that establishment, are, according to Mr. Brande, as follows:—50 pounds of mercury are boiled to dryness with 70 pounds of sulphuric acid, in a cast iron vessel. Sixty-two pounds of the dry salt formed are triturated with 40½ pounds of mercury till the globules disappear, and the whole is mixed with 34 pounds of common salt. The mixture is then heated in earthen vessels, and the product is from 95 to 100 pounds of calomel. The sublimate is next ground to an impalpable powder, and washed with a large quantity of distilled water.

The object of bringing calomel into a state of minute division, is more perfectly accomplished by the method of Mr. Jewell of London, for which he has taken out a patent. It consists in causing the calomel in vapour to come in contact with steam in the subliming vessel, whereby it is condensed in the form of an impalpable powder, and perfectly washed from corrosive sublimate, in the same operation. Calomel made by this process, sometimes called Jewell's or Howard's *hydrosublimate of mercury*, is lighter than that ordinarily prepared in the proportion of three to five, (*Paris's Pharmacologia*,) and free from all suspicion of containing corrosive sublimate; and as it is much finer than when obtained by levigation and elutriation, it probably possesses more activity as a medicine. This process has been admitted into the French Codex.

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* By *neutral* is here meant, neutral in composition, as Dr. Turner terms it; that is, consisting of *one* equiv. of acid, and one of base.

Properties. Mild chloride of mercury is a tasteless, inodorous, insoluble substance, less volatile than corrosive sublimate, unalterable in the air, but blackening by long exposure to light. When in-mass, its form and appearance depend upon the shape and temperature of the subliming vessel. In this state, it is generally in the form of a white crystalline cake, the interior surface of which is studded with shining transparent crystals, having the shape of quadrangular prisms, and a texture somewhat horny and elastic. When the mass is scratched it yields a yellow streak, which is very characteristic. Its sp. gr. is 7.2. The officinal form of this chloride is that of powder, in which state it always exists in the shops. The powder has a light buff or ivory colour, if obtained by the levigation of sublimed masses, but if condensed at once in the form of an impalpable powder, as is the case with Jewell's calomel, it is perfectly white. To protect it from the action of the light, it should be kept in a dark place, or in bottles painted black or covered with black paper. By the action of the alkalies or alkaline earths it immediately becomes black, in consequence of the formation of protoxide. (See *Hydrargyri Oxidum Cinereum*, and *Hydrargyri Oxidum Nigrum.*) The composition of calomel has already been mentioned. The first European writer by whom it was described was Beguin, in 1608; but the researches of Mr. Hatchett seem to prove that it was long known and prepared in Thibet.

Tests of Purity, and Incompatibles. Calomel, when pure, completely sublimes on the application of heat, and strikes a black colour, free from reddish tinge, by the action of the fixed alkalies. The buff colour indicates the absence of corrosive sublimate; but whiteness by no means shows the presence of impurity. Its freedom from the corrosive chloride may be judged of by digesting a small portion of it in alcohol, and then testing the alcohol with caustic potassa or ammonia, the former of which will cause a yellow precipitate, the latter a white one, in case the menstruum has taken up any of this chloride. Besides being incompatible with the alkalies and alkaline earths, it is also decomposed by the alkaline carbonates, soaps, hydrosulphates, and, according to some authorities, by iron, lead, and copper. B.

Medical Properties and Uses. Calomel unites to the general properties of the mercurials, those of a purgative and anthelmintic. It is the most valuable of the mercurial preparations, and in extent of employment is inferior to few articles of the Materia Medica. Whether the object is to bring the system under the general influence of mercury, or to produce its alterative action upon the hepatic or other secretory functions, calomel, on account both of its certainty and mildness, is preferred to all other preparations, with the single exception of the blue pill, which, though less certain, is still milder, and is sometimes preferably employed. When used with the above objects, the tendency to purge which it sometimes evinces, even in very small doses, must be restrained by combining it with opium. In sialagogue or alterative doses, it is often prescribed with other medicines, which, while they give it a direction to certain organs, have their own peculiar influence increased by its co-operation. Thus it renders squill more diuretic, nitre and the antimonials more diaphoretic, and seneka more expectorant.

As a purgative, calomel owes its chief value to its tendency to the liver, the secretory function of which it powerfully stimulates. It is usually slow and somewhat uncertain in its cathartic effect, and though itself unirritating, sometimes occasions severe griping pain with bilious vomiting, attributable to the acrid character of the bile which it causes the liver to secrete. It is peculiarly useful in the commencement of bilious fevers, in hepatitis, jaundice, bilious and painters' colic, dysentery, especially that of tropical climates, and all other affections attended with congestion of the portal system, or torpidity of the hepatic vessels. The difficulty with which it is thrown from the stomach, renders it highly useful in some cases of obstinate vomiting, when other remedies are rejected. In the cases of children, it is peculiarly valuable from the facility of its administration; and in the febrile complaints to which they are subject, appears to exercise a curative influence, depending on some other cause than its mere purgative effect, and perhaps referrible to its action upon the liver. In the treatment of worms it is one of the most efficient remedies, acting probably not only as a purgative, but also as an irritant to the worms, either by its immediate influence, or that of the acrid bile which it causes to flow. The slowness and uncertainty of its action, and its liability to salivate if too long retained in the bowels, render it proper either to follow or combine it with other cathartics, in order to ensure its purgative effect. When given alone, it should be followed, if it do not operate in six or seven hours, by a dose of castor oil or sulphate of magnesia. The cathartics with which it is most frequently combined are jalap, rhubarb, aloes, scammony, colocynth, and gamboge. It is often added in small quantities to purgative combinations, with a view to its influence on the biliary organs.

It is sometimes used as an errhine in amaurosis, mixed with twice its weight of sugar, or other mild powder; and in the same combination is occasionally employed to remove specks and opacity of the cornea. For this latter purpose, Dupuytren recommends particularly the calomel prepared according to the plan of Mr. Jewell. Calomel is also sometimes employed externally in herpetic and other eruptions, in the shape of an ointment.

The dose as an alterative in functional derangement of the liver, is from half a grain to a grain every night, or every other night, followed in the morning, if the bowels are not opened, by a gentle saline laxative. When the stomach or bowels are very irritable, as in cholera and diarrhœa, from an eighth to a quarter of a grain may be given every hour or two, so as to amount to one or two grains in the course of the day. With a view to salivation, the dose is from half a grain to a grain three or four times a day, to be increased considerably in urgent cases. When large doses are given with this view, it is often necessary to combine them with opium. As a purgative, from five to fifteen grains or more may be given. Calomel has the peculiarity that its cathartic action is not increased in proportion to the dose, and enormous quantities have sometimes been given with impunity. In yellow fever, tropical dysentery, &c., from twenty grains to a drachm have been given and repeated at short intervals, without producing hypercatharsis; but this practice is justifiable only in cases of extreme urgency, in which salivation as well as purgation is indicated. Even in very small doses of not more than one, two, or three grains, calomel purges some individuals briskly. In these persons, large doses, though they do not proportionably increase the evacuation, often occasion excessive spasmodic pain in the stomach and bowels. For children, larger doses are generally required in proportion than for adults. Not less than from three to six grains should be given to a child two or three years old, and this quantity often fails to act on the bowels, unless assisted by castor oil, or some other cathartic. Calomel may be given in pill made with gum Arabic and syrup, or in powder mixed with syrup or molasses.

Off. Prep. Hydrargyri Oxydum Cinereum, *Lond.*, *Ed.*; Hydrargyri Oxidum Nigrum, *U.S.*, *Dub.*; Pilulæ Catharticæ Compositæ, *U.S.*; Pilulæ Hydrargyri Chloridi Mitis, *U.S.*; Pil. Hydrarg. Submuriatis Comp., *Lond.*, *Ed.*, *Dub.* W.

CALOMELAS PRÆCIPITATUM. *Dub.* SUB-MURIAS HYDRARGYRI PRÆCIPITATUS. *Ed.* *Precipitated Calomel. Precipitated Sub-Muriate of Mercury.*

"Take of Purified Mercury *seventeen parts;* Diluted Nitric Acid *fifteen parts.* Pour the Acid upon the Mercury in a glass vessel; and when the mixture shall have ceased to effervesce, digest with a medium heat, with occasional agitation for six hours. Then increase the heat that the liquor may boil for a short time, and afterwards pour it off from the residual Mercury, and quickly mix it with *four hundred parts* of boiling Water, containing *seven parts* of Muriate of Soda in solution. Wash the powder which subsides with warm Distilled Water, as long as the liquor decanted from it is precipitated by the addition of a few drops of Water of Caustic Potassa; and, lastly, dry it." *Dub.*

The *Edinburgh College* orders *eight ounces,* each, of diluted nitrous acid and purified mercury, *four ounces and a half* of muriate of soda; and *eight pounds* of boiling water, and treats the materials generally as directed in the Dublin formula.

The method of forming calomel in the humid way, or by precipitation, was first proposed by Scheele. It consists of two steps; first, the formation of a protonitrate of mercury by dissolving the metal in weak nitric acid, and secondly, the decomposition of this salt by means of a hot solution of common salt. The latter compound may be supposed to become by solution, muriate of soda, and when it reacts upon the protonitrate, a double decomposition takes place. The nitric acid combines with the soda, and remains in solution as nitrate of soda, while the elements of the muriatic acid and protoxide of mercury unite in such a manner as to form water and protochloride of mercury, the latter of which precipitates. Though this process is sufficiently simple in theory, the performance of it is attended with some difficulty. It is necessary, in the first place, to prepare a pure *proto*nitrate, an object in which the operator is apt to miscarry, in consequence of the liability of the metal to become peroxidized by the action of nitric acid. To guard against this result, weak nitric acid is employed, more mercury is ordered than the acid can dissolve, and a moderate heat is applied, and that only after the effervescence has ceased. In the next place, the operator must guard against the precipitation of a subnitrate, which is always thrown down by the action of water upon the *neutral* nitrate. To prevent the production of this impurity, it is necessary slightly to acidulate the nitric solution of the mercury with nitric acid, or the solution of common salt with muriatic acid; for an excess of acid in either of the solutions effectually prevents the formation of the subnitrate. This necessary precaution has been omitted in the directions of the Dublin and Edinburgh Colleges. The reason why the peroxidation of the metal, and consequently the production of bipernitrate is to be avoided, is, that this salt, by double decomposition with the solution of muriate of soda, generates corrosive sublimate in solution, which, in this state, may be viewed as a bipermuriate. The result is thus explained. The two equiv. of nitric acid combine with two equiv. of soda, and thereby cause the decomposition of two equiv. of the dissolved muriate of soda. Two equiv. of muriatic acid are thus set free, which, by uniting with the peroxide of mercury, form the bipermuriate in solution, or corrosive sublimate. The production of corrosive sublimate in this way in the process will not injure the precipitated calomel, provided this be thoroughly washed; but it is objectionable as diminishing its quantity. When, however, the subnitrate is allowed to be formed, it contaminates the precipitated calomel, and, from its insolubility, cannot be separated by washing. As, notwithstanding every precaution, corrosive sublimate will be formed in this process, the liquor poured off from the precipitated calomel should be reserved for forming *white precipitate*, as is directed by the Dublin College. (See *Hydrargyrum Ammoniatum.*)

Properties, &c. Precipitated calomel, when properly prepared, scarcely differs in properties from sublimed calomel. It is stated to be whiter, smoother, and lighter than when obtained by sublimation. Another difference, according to Göttling, is, that the precipitated calomel produces a gray, while the sublimed causes a black colour, when triturated with lime-water. The presence of subnitrate may be detected by digesting the calomel in water containing a little nitric acid, and then testing the acid by an alkali, which will cause a precipitate, if any subnitrate has been taken up. Corrosive sublimate is discovered by testing alcohol, digested on a portion of it, by ammonia or caustic potassa.

The medical properties of precipitated calomel are the same as those of the ordinary sublimed calomel. By some it is supposed to be more purgative. Upon the whole, it may be viewed as a superfluous preparation. B.

HYDRARGYRI CYANURETUM. *U.S., Dub.* *Cyanuret of Mercury. Prussiate of Mercury.*

"Take of Red Oxide of Mercury *three ounces;* Ferrocyanate of Iron [Prussian Blue] *six ounces;* Distilled Water *three pints.* Put the Oxide of Mercury and the Ferrocyanate of Iron, previously powdered and thoroughly mixed together, in a glass vessel; and pour upon them two pints of the Distilled Water. Then boil the mixture, stirring constantly, till it becomes of a yellowish colour; after which filter it through paper. Wash the residue in a pint of Distilled Water, and filter as before. Mix the solutions, and evaporate by the fire till a pellicle appears; then set the liquor aside that crystals may form. To purify the crystals, dissolve them again in distilled water, filter and evaporate the solution, and set it aside to crystallize." *U.S.*

"Take of Cyanuret of Iron [Prussian Blue] *six parts;* Nitric Oxide of Mercury [Red Precipitate] *five parts;* Distilled Water *forty parts.* Mix the Cyanuret of Iron and Oxide of Mercury, and then add them to the Water previously warmed. Boil the mixture with constant stirring, for half an hour, and filter through bibulous paper. Wash the residue frequently with warm Distilled Water. Lastly, filter the liquors, and evaporate them until they furnish crystals by refrigeration." *Dub.*

The above processes are essentially the same; their object being to present cyanogen and mercury to each other under favourable circumstances for combination. The compound formed consists of two equiv. of cyanogen, and one of mercury. It is, therefore, properly speaking, a *bi*cyanuret. As Prussian blue is a cyanuret of iron, the reaction which occurs is a case of double decomposition, resulting in the formation of bicyanuret of mercury, and peroxide of iron. The U.S. and Dublin formulæ present a great disparity in the proportions of the reacting ingredients employed. In favour of the proportions adopted in the U.S. Pharmacopœia, it may be stated that they are the same with those adopted in the Paris Codex, and which are recommended by Berzelius. As Prussian blue is of variable quality, perhaps the best rule in conducting the process, would be to add the red oxide of mercury at intervals to the boiling water containing the Prussian blue, until the blue colour is replaced by a bright brown, a change indicative of the complete decomposition of the ferruginous cyanuret.

Winkler prepares the bicyanuret of mercury by the following process. Mix 15 parts of ferrocyanate (prussiate) of potassa in powder with 13 parts of concentrated sulphuric acid, and 100 parts of water. Distil the mixture to dryness into a receiver, containing 30 parts of water. The ferrocyanate is decomposed, sulphate of potassa is formed in the retort, and hydrocyanic acid distils over. Of the acid thus obtained, reserve a portion, and mix the rest with 16 parts of red oxide of mercury in fine powder, and stir the mixture till the odour of hydrocyanic acid has entirely disappeared. Then decant the liquor, and add for the purpose of saturating it, the portion of acid that had been reserved. This process gives 12 parts of the bicyanuret. If the liquor were not treated with free hydrocyanic acid after having acted on the red oxide, it would probably contain some of this oxide in excess, and when evaporated would yield, instead of the bicyanuret, a peculiar salt, composed of this cyanuret and the red oxide, which crystallizes in small acicular crystals.

Properties, &c. Cyanuret of mercury is a white substance, permanent in the air, and crystallized in quadrangular obliquely truncated prisms, which are devoid of water of crystallization, and have a disagreeable styptic taste. It is but sparingly soluble in alcohol, but dissolves readily in cold water, and much more abundantly in hot. When heated it yields cyanogen, and mercury remains behind. It acts on the animal economy as a potent poison. It has been occasionally tried as a remedy in syphilis, in doses of from an eighth to a sixth of a grain; but it was introduced into the U.S. and Dublin Pharmacopœias, for the purpose of being employed in the preparation of hydrocyanic acid. Its composition has been already given. For the properties and composition of cyanogen, see *Acidum Hydrocyanicum.*

Off. Prep. Acidum Hydrocyanicum, *U. S., Dub.* B.

HYDRARGYRI OXYDUM CINEREUM. *Lond.* OXIDUM HYDRARGYRI CINEREUM. *Ed.* *Gray Oxide of Mercury.*

"Take of Submuriate of Mercury [Calomel] *an ounce;* Lime-water *a gallon.* Boil the Submuriate of Mercury in the Lime-water, stirring constantly, until the Gray Oxide of Mercury subsides. Wash this with distilled water; then dry it." *Lond.*

"Take of Sub-Muriate of Mercury *half an ounce;* Lime-water *five pounds.* Boil the Sub-Muriate in the Lime-water for a quarter of an hour in a lightly covered vessel. Pour off the supernatant liquor, wash the Oxide with distilled water, and then dry it." *Ed.*

The object of these processes is to obtain the protoxide or black oxide of mercury, which was at one time believed to be the active constituent of those preparations, in which the metal is minutely divided by trituration. When calomel is agitated with lime-water, a portion of the water is decomposed, giving its hydrogen to the chlorine of the calomel to form muriatic acid which unites with the lime, and its oxygen to the metal to form protoxide of mercury. The muriate of lime remains in solution, and the oxide subsides. But it is extremely difficult completely to decompose calomel in this manner, on account of the obstacle which its insolubility and the dilute nature of the solution of lime presents to that close contact of particles which is essential to the chemical reaction of different bodies on each other. Hence the protoxide, in this preparation, is almost always mixed with a portion of calomel, which is greater or less, according to the care with which the process has been conducted. When the proportion is large, the powder has the grayish colour to which it owes its officinal title; when very small, it scarcely differs in appearance or properties from the oxide described under the following head. From the uncertainty of its composition, it should be discarded from the officinal lists, as it generally has been from practical use.

Off. Prep. Unguentum Oxidi Hydrargyri Cinerei, *Ed.* W.

HYDRARGYRI OXIDUM NIGRUM. *U.S.* HYDRARGYRI OXYDUM NIGRUM. *Dub.* *Black Oxide of Mercury.*

"Take of Mild Chloride of Mercury [Calomel], Potassa, each, *four ounces;* Water *a pint.* Dissolve the Potassa in the Water, and when the dregs shall have subsided, pour off the clear solution. To this add the Chloride of Mercury, and stir them constantly together, till the Black Oxide is formed. Having poured off the supernatant liquor, wash the Black Oxide with Distilled Water, and dry it with a gentle heat." *U. S.*

"Take of Sublimed Calomel *one part;* Water of Caustic Potassa, heated, *four parts.* Rub them together until an oxide of a black colour is obtained; wash this frequently with water, and dry it upon bibulous paper with a *medium* heat." *Dub.*

These processes afford the protoxide of mercury in a purer state than the preceding. Calomel is completely decomposed by the solution of potassa; its chlorine being converted by union with the hydrogen of the water into muriatic acid, which combines with the potassa and remains in solution, while the mercury unites with the oxygen of the water to form the protoxide of that metal, which subsides. The U.S. and Dublin processes are essentially the same. In both, more potassa is employed than by calculation would seem to be requisite; but it has been ascertained by experiment, that a considerable excess is necessary for the complete decomposition of the calomel. In the U.S. process, however, the quantity is, perhaps, unnecessarily large; being more than double the proportion contained in the "water of caustic potassa," directed by the Dublin College. The use of the officinal solution of potassa is preferable, on the score of economy, to that of a solution extemporaneously prepared from the caustic alkali. In order to ensure the success of the process, the calomel, very finely levigated, should be rubbed quickly with the alkaline solution in a mortar; and the resulting oxide should be dried in the dark with a very gentle heat, as it is decomposed by the agency both of light and of an elevated temperature. For the same reason it should be preserved in an opaque bottle. This mode of preparing the black oxide of mercury was introduced into use by Mr. Donovan.

The oxide may also be prepared by decomposing a solution of the protonitrate of mercury by the solution of potassa. The protonitrate may be obtained by treating twenty parts of mercury with eighteen parts of nitric acid of 25° Baumé, adding, when nitrous vapours cease to rise, ten parts of warm distilled water, boiling for a short time, decanting the clear liquor, and setting it aside to crystallize. The mother waters by evaporation will furnish a new product of crystals of protonitrate. (*Ratier's Pharm. Franc.*) The preparation, formerly officinal in the Dublin Pharmacopœia under the name of *Pulvis Hydrargyri Cinereus*, made by adding carbonate of ammonia to a solution of mercury in heated nitric acid, was a mixture of subnitrate of mercury and ammonia with the protoxide of mercury.

Properties, &c. As first prepared, this oxide is greenish-black; but as found in the shops it is almost always of an olive colour, owing, it is supposed, to the chemical changes which it undergoes. It is inodorous, tasteless, and insoluble in water; and consists of one equiv. of mercury 202, and one equiv. of oxygen 8=210. On exposure to light or heat it is decomposed, one part assuming the metallic state, in consequence of the loss of its oxygen, which converts another part into the peroxide. The preparation, therefore, becomes a mixture of the protoxide, the peroxide, and metallic mercury, with which calomel is sometimes associated, in consequence of the incomplete decomposition of that originally employed in the process. When pure it is soluble in acetic, and entirely insoluble in muriatic acid. If it contain the peroxide, this is dissolved by muriatic acid, and may be detected in the solution by the production of a white precipitate with water of ammonia, and of a yellow one with solution of potassa. Calomel, if present, may be discovered by boiling the powder with a solution of potassa, thus forming a muriate of that base, which, when the solution is saturated with nitric acid, will afford a white precipitate of chloride of silver on the addition of nitrate of silver. (*Phillips.*)

Medical Properties and Uses. The black oxide is alterative, sialagogue, and purgative. It may be employed for the same purposes with calomel, over which, however, it has not in our hands exhibited any superiority, while, from the occasional presence of the peroxide, it must be liable to operate harshly. The idea under which it was introduced into use, that it was the basis of the blue pill, is probably erroneous. Made into an ointment with lard, according to the process of Donovan, it may be applied externally with good effect in bringing the system under the mercurial influence. (See *Unguentum Hydrargyri.*) Its dose as an alterative is one-fourth or half a grain daily, as a sialagogue from one to three grains two or three times a day, given in the form of pill. W.

HYDRARGYRI OXIDUM RUBRUM. *U. S.* HYDRARGYRI NITRICO-OXIDUM. *Lond.* OXIDUM HYDRARGYRI RUBRUM per Acidum Nitricum. *Ed.* HYDRARGYRI OXYDUM NITRICUM. *Dub.* *Red Oxide of Mercury. Red Precipitate.*

"Take of Purified Mercury *three pounds;* Nitric Acid *a pound and a half;* Distilled Water *two pints.* Mix them in a glass vessel, and boil till the Mercury is dissolved, and a white mass remains after the evaporation of the Water. Rub this into powder, and throw it into a very shallow vessel; then apply a gentle heat, and gradually increase it, till red vapours cease to arise." *U. S., Lond.*

"Take of Purified Mercury *three parts;* Diluted Nitrous Acid *four parts.* Dissolve the Mercury, and evaporate the solution, with a gentle heat, to a dry white mass; which, having been rubbed into powder, is to be put into a glass cucurbit, and covered with a thick glass plate. Then, a capital having been adapted, and the vessel placed in a sand-bath, let the contained matter be roasted by a gradually increased heat, until the matter is converted into small bright red scales." *Ed.*

"Take of Purified Mercury *two parts;* Diluted Nitric Acid *three parts.* Dissolve the Mercury, and let heat be applied until the dried mass is converted into red scales." *Dub.*

The white mass obtained in the first of these processes is either the pernitrate of mercury, or a mixture of the pernitrate and protonitrate. When exposed to a strong heat it is decomposed, giving out red nitrous fumes, and assuming successively a yellow, orange, and brilliant purple-red colour, which becomes orange-red on cooling. These changes are owing to the gradual separation and decomposition of the nitric acid, by the oxygen of which the protoxide of the protonitrate, if any be present, is converted into peroxide, while nitric oxide gas escapes, and takes the form of nitrous acid vapour on contact with the air. The peroxide of mercury is left behind, but not entirely free from nitric acid, which cannot be wholly expelled by heat, without endangering the decomposition of the oxide itself, and the volatilization of the metal. The preparation is, in common language, called *red precipitate.* The name of *red oxide of mercury*, by which it is designated in the U. S. Pharmacopœia, is appropriate, as the nitric acid exists merely as an incidental impurity; and there is no occasion to distinguish the preparation from the pure peroxide obtained by heating mercury, as the latter is not recognised in our Pharmacopœia, and is never employed in this country.

In the preparation of this mercurial, various circumstances influence in some measure the nature of the product, and must be attended to, if we desire to procure the oxide with that fine bright orange-red colour, and shining scaly appearance, which are usually considered desirable. Among these circumstances is the condition of the nitrate of mercury submitted to calcination. According to Gay-Lussac, it should be employed in the form of small crystalline grains. If previously pulverized, as directed in the U.S., London, and Edinburgh processes, it will yield an orange-yellow powder; if it be in the state of large and dense crystals, the oxide will have a deep orange colour. Care must also be taken that the mercury and acid be free from impurities. It is highly important that sufficient nitric acid be employed fully to saturate the mercury. The quantity directed in the U. S. and London Pharmacopœias is deficient by theory, and, as we have been informed, has not been found to answer in practice. M. Payssé, who paid great attention to the manufacture of red precipitate, recommends 70 parts of nitric acid from 34° to 38° Baumé, to 50 parts of mercury. This, however, is an excess of acid. We have been told by a skilful practical chemist of Philadelphia, that he has found, by repeated experiment, 7 parts of nitric acid of 35° Baumé, to be sufficient fully to saturate 6 parts of mercury. Less will not answer, and more would be useless. It is not necessary that the salt should be removed from the vessel in which it is formed; and it is even asserted that the product is always more beautiful when the calcination is performed in the same vessel. A matrass may be used with a large flat bottom, so that an extended surface may be exposed, and all parts heated equally. The metal and acid having been introduced, the matrass should be placed in a sand-bath, and covered with sand up to the neck. The solution of the mercury should be favoured with a gentle heat, which should afterwards be gradually increased till red vapours make their appearance, then maintained as equably as possible till these vapours cease, and at last slightly elevated till oxygen gas begins to escape. This may be known by the increased brilliancy with which a taper will burn if placed in the mouth of the matrass, or by its rekindling if partially extinguished. Too high a temperature must be carefully avoided, as it decomposes the oxide, and volatilizes the mercury. At the close of the operation, the mouth of the vessel should be stopped, and the heat gradually diminished, the matrass being still allowed to remain in the sand-bath. These last precautions are said to be essential to the fine red colour of the preparation. It is best to operate upon a large quantity of materials, as the heat may be thus more steadily and uniformly maintained.

As the process is ordinarily conducted in chemical laboratories, the nitrate of mercury is decomposed in shallow earthen vessels, several of which are placed upon a bed of sand in the chamber of an oven or furnace provided with a flue for the escape of the vapours. Each vessel may conveniently contain ten pounds of the nitrate. There is always some loss in the operation conducted in this way.

Properties, &c. Red precipitate, when well prepared, has a brilliant red colour with a shade of orange, a shining scaly appearance, and an acrid taste. It is very slightly soluble in water, of which Dr. Barker found 1000 parts to take up only 0.62 of the oxide. Nitric acid dissolves it without effervescence. At a red heat it is decomposed and entirely dissipated. As before stated it is not a perfectly pure peroxide; but is mixed with a minute proportion of nitric acid, probably in the state of subpernitrate. Perhaps it is to this salt, which is of a yellow colour, that red precipitate owes the orange tint which distinguishes it from the red oxide procured by heating metallic mercury. According to Brande, when rubbed and washed with a solution of potassa, edulcorated with distilled water, and carefully dried, it may be regarded as a nearly pure peroxide. It is said to be sometimes adulterated with brickdust, red lead, &c.; but these may be readily detected, as the oxide of mercury is wholly dissipated if thrown upon red-hot iron.

Medical Properties and Uses. This preparation is too harsh and irregular in its operation for internal use, but is much employed externally as a stimulant and escharotic, either in the state of powder or of ointment. In the former state it is sprinkled on the surface of chancres, and indolent, flabby, or fungous ulcers; and mixed with 8 or 10 parts of finely powdered sugar is sometimes blown into the eye to remove opacity of the cornea. The powder should be finely levigated. The ointment is officinal. (See *Unguentum Hydrargyri Oxidi Rubri.*)

Off. Prep. Hydrargyri Cyanuretum. *U. S.*, *Dub.;* Unguent. Hydrarg. Oxid. Rub., *U. S.*, *Lond.*, *Ed.*, *Dub.* W.

HYDRARGYRI OXYDUM RUBRUM. *Lond.*, *Dub.* *Red Oxide of Mercury. Precipitate per se. Calcined Mercury.*

"Take of Purified Mercury *a pound*. Put it into a tall glass vessel, with a narrow mouth and broad bottom. To this vessel, unclosed, apply a heat of 600°, till the Mercury passes into red scales; then rub them into a very fine powder." *Lond.*

"Take of Purified Mercury *any quantity*. Put it into an open glass vessel, with a narrow mouth and broad bottom, and expose it to a heat of about 600°, till it is converted into red scales." *Dub.*

As mercury requires for its oxidation a temperature little short of its boiling point, it is necessary that the vessel in which it is heated be so constructed as to prevent the escape of the vapour which rises during the process. A glass matrass is usually employed, having a narrow neck, drawn out at top into an almost capillary orifice. But the arrangement which serves to confine the mercurial vapour, impedes also the free access of air; so that the process is exceedingly tedious. The mercury introduced should not be more than sufficient to cover the bottom of the vessel, which should be heated by means of a sand-bath till vapours begin to rise. These are condensed in the upper part of the matrass, and by maintaining the temperature steadily at this point, a constant circulation of vapour is kept up within the vessel. The metal very slowly combines with the oxygen, forming first a black, and then a red powder, molecules of which begin to appear after some days, and gradually increase till they cover the surface of the mercury. Care must be taken not to increase the heat too much, as not only is the mercury thus volatilized, but the oxide already formed is decomposed. Several weeks are requisite for the complete oxidation of a small portion of metal, and the process is necessarily expensive. The preparation is the *hydrargyrum præcipitatum per se*, or *precipitate per se* of the older chemical writers.

Properties, &c. It is in minute, sparkling, crystalline scales, of a deep red colour becoming still deeper by heat, inodorous, of an acrid taste, very slightly soluble in water, and freely soluble in nitric, muriatic, and some other acids. Its aqueous solution changes the infusion of violets to green.

It consists of one equiv. of mercury 202, and two of oxygen 16=218. At a red heat it is decomposed, oxygen being given off, and the mercury revived. Its solutions in the acids afford, with potassa and soda, an orange-coloured precipitate of the peroxide, and with ammonia a white precipitate, consisting of the acid, peroxide, and ammonia. Its high price affords an inducement for adulteration, to avoid which it should be kept in the crystalline state, and not in powder as directed by the London College. If pure, it is wholly volatilized by a red heat.

Medical Properties and Uses. It has the general properties of the mercurial preparations, but is apt to vomit and purge, and to act otherwise violently on the stomach and bowels. Though formerly used in the treatment of syphilis, it has been entirely abandoned. It has been employed externally for the same purposes with the red precipitate; but is much more costly, without having any superiority. In this country it is almost unknown as a medicine. The dose may be from one-sixth of a grain to a grain. W.

HYDRARGYRI PERSULPHAS. *Dub.* *Persulphate of Mercury.*

"Take of Purified Mercury, Sulphuric Acid, each, *six parts;* Nitric Acid *one part.* Expose them to heat in a glass vessel, and increase the heat until the mass becomes white and perfectly dry." *Dub.*

When an excess of sulphuric acid is boiled to dryness upon mercury, the metal is peroxidized at the expense of part of the acid, sulphurous acid is copiously evolved, and the peroxide formed unites with the undecomposed portion of the sulphuric acid, so as to form the *bi*sulphate of the peroxide of mercury, which is the persulphate of the Dublin College. In the Dublin formula, the peroxidation of the metal is assisted by a small portion of nitric acid, the use of which, though not essential to the result, is stated by Dr. Barker to facilitate and shorten the process, and to afford a much whiter salt than when sulphuric acid alone is employed. When the nitric acid is used, orange-coloured fumes are given off on the first application of the heat, and the acid is totally decomposed.

Persulphate of mercury, as obtained by a separate formula, is peculiar to the Dublin Pharmacopœia; but it is formed as the first step of the processes of the other Pharmacopœias for obtaining corrosive sublimate and turpeth mineral, and of the U.S. and London Pharmacopœias for procuring sublimed calomel. The adoption of a separate formula and distinct officinal name for this salt, is certainly an improvement on the part of the Dublin College; as it obviates the necessity of repeating the process for obtaining the same substance in several distinct formulæ. On account of its important uses, it requires to be made on a large scale by the manufacturing chemist and the process is generally performed in a cast-iron vessel, which should be conveniently arranged for the escape and decomposition of the sulphurous acid fumes, which otherwise become a serious nuisance to the neighbourhood. The best way to effect this purpose is to allow them to pass off through a very lofty chimney mixed with abundance of coal smoke.

Properties, &c. Persulphate of mercury is in the form of a white saline mass. It consists of two equiv. of acid 80.2 and one of peroxide of mercury 218=298.2. It has no medical uses.

Off. Prep. Calomelas sublimatum, *Dub.;* Hydrargyri Murias Corrosivum, *Dub.;* Hydrargyri Oxidum Sulphuricum, *Dub.* B.

HYDRARGYRI SULPHAS FLAVUS. *U.S.* SUB-SULPHAS HYDRARGYRI FLAVUS. *Ed.* HYDRARGYRI OXYDUM SULPHURICUM. *Dub.* *Yellow Sulphate of Mercury. Turpeth Mineral.*

"Take of Purified Mercury *four ounces;* Sulphuric Acid *six ounces.* Mix in a glass vessel, and boil, by means of a sand-bath, till a dry white mass remains. Rub this into powder and throw it into boiling water. Pour off the supernatant liquor, and wash the yellow precipitated powder repeatedly with hot water; then dry it." *U. S.*

The *Edinburgh* formula is the same as the above, except in phraseology.

"Take of Persulphate of Mercury *one part;* Warm Water *twenty parts.* Rub them together in an earthenware mortar, and pour off the supernatant liquor. Wash the yellow powder with warm distilled Water so long as the decanted liquor is precipitated by the addition of a few drops of the Water of Caustic Potassa. Lastly, dry the Sulphuric Oxide of Mercury." *Dub.*

By referring to the articles on corrosive sublimate and calomel, it will be found that the peculiar salt which is generated by boiling sulphuric acid on mercury to dryness, is directed to be obtained as the first step of several of the processes; and here it is perceived that in the U.S. and Edinburgh formulæ, the same salt is again directed to be formed. The Dublin College has very properly avoided these repetitions, by adopting a distinct formula and name for the salt in question. We have already mentioned that this compound is the bisulphate of the peroxide of mercury. When obtained as the first step in the processes for corrosive sublimate and calomel, the proportion of metal and acid uniformly adopted is as 4 to 5; when procured by the separate formula of the Dublin College, the quantities used are equal parts; while the proportion directed in the U.S. and Edinburgh formulæ for turpeth mineral is as 2 to 3. There can be no good reason for these discrepancies, and, therefore, some uniform proportion should be selected. We incline to believe that 4 of metal to 5 of acid is the most eligible proportion. The Dublin College may, perhaps, be justifiable in using less sulphuric acid; as, in their formula for the bipersulphate, the mercury is partly oxidized at the expense of the nitric acid employed. (See the preceding article, where the formation of this salt is explained.)

When the bipersulphate of mercury is thrown into boiling or even warm water it is instantly decomposed, and an insoluble salt is precipitated, which is the turpeth mineral. The change which takes place is generally supposed to consist in the separation, by the action of the water, of one equiv. of sulphuric acid; and, on this supposition, the preparation under consideration would be simply a sulphate of the peroxide of mercury. But it would appear that the water separates something more than sulphuric acid; for the supernatant liquid is found to contain mercury, and, when duly evaporated, will yield a salt in white, crystalline, deliquescent needles. Berzelius is of opinion that the water resolves the bipersulphate into an insoluble subsesquisulphate, and a soluble supersulphate containing six equiv. of acid to one of base; and this view corresponds better with the facts than the other.

Properties, &c. Yellow sulphate of mercury is in the form of a powder of a lemon-yellow colour, and possessing a somewhat acrid taste. It dissolves in 2000 parts of cold water, and in about 600 parts at the boiling temperature. When exposed to a moderate heat, it becomes first red and afterwards brownish-red, but regains its original colour on cooling. (*Barker.*) At a red heat it is decomposed and dissipated without residue. It was originally called *turpeth* mineral, from the resemblance of its colour to that of the root of the *Ipomœa Turpethum*, a plant formerly used in medicine. It consists, according to most authorities, of one equiv. of sulphuric acid and one of peroxide of mercury; but according to Berzelius, of one equiv. of sulphuric acid, and an equiv. and a half of peroxide. Though its composition is not well settled, it is evidently not a mere *oxide* of mercury, as called by the Dublin College; and even if it were an oxide, the prefix of this College—*sulphuric*—is not in accordance with any recognised principle of nomenclature.

Medical Properties and Uses. Turpeth mineral is alterative, and powerfully emetic and errhine. As an alterative, it has been given in leprous disorders and glandular obstructions. It has been employed with benefit as an emetic, repeated every few days, in chronic enlargements of the testicle; but it often operates with great violence, and is apt to excite severe ptyalism. It proves useful in these cases upon the principle of revulsion, and by giving activity to the absorbents. As an errhine, it has been used with advantage in chronic ophthalmia, and in diseases of the head; and it sometimes produces salivation when thus employed. The dose, as an alterative, is from a quarter to half a grain; as an emetic, from two to five grains. When employed as an errhine, one grain may be mixed with five grains of starch or powdered liquorice root. B.

HYDRARGYRI SULPHURETUM NIGRUM. *U.S., Lond., Dub.* SULPHURETUM HYDRARGYRI NIGRUM. *Ed. Black Sulphuret of Mercury. Ethiops Mineral.*

"Take of Purified Mercury, Sulphur, each, *a pound.* Rub them together in a glass mortar till all the globules disappear." *U.S.*

The *London* process is the same as the above, except that it does not designate the kind of vessel in which the trituration is to be performed. The *Edinburgh College* takes equal parts of the materials, and directs the use of a glass mortar and pestle, and at the end of the formula, mentions that the preparation may be made with a double proportion of mercury. The *Dublin College* takes equal parts also, and orders the trituration to be performed in a stoneware mortar.

Mercury and sulphur have a strong affinity for each other; as is shown by the fact, that when they are triturated together in quantities, the mixture grows hot, cakes, and exhales a sulphureous odour. When rubbed together in equal weights, as directed in the Pharmacopœias, they are supposed to unite chemically; but the proportion of sulphur is much greater than is necessary to form a definite compound. Only two sulphurets of mercury have been admitted by the generality of chemists, a protosulphuret, and a bisulphuret or cinnabar; and the quantity of sulphur, directed in the above processes, is much more than sufficient to form even the latter. Thus, it still remains an unsettled point, what is the exact nature of the officinal black sulphuret, or *ethiops mineral.* Mr. Phillips supposes it to be a mixture of protosulphuret and sulphur; but it appears to have been experimentally proved by Mr. Brande to be a bisulphuret mixed with a portion of sulphur. Thus it was found by the latter chemist, that when boiled repeatedly in a solution of potassa, sulphur was dissolved by the alkali, and a black insoluble powder was left, which sublimed, without decomposition, into a substance having all the characters of cinnabar.

Ethiops mineral is sometimes obtained by melting the sulphur in a crucible, and adding the mercury to it; but when thus prepared, the sulphur is apt to become acidified, and the preparation to acquire an activity which does not belong to it when obtained by trituration. The latter method, accordingly, ought always to be employed.

Properties, &c. Black sulphuret of mercury is in the form of an insoluble, tasteless, very black powder. When exposed to heat, it becomes of a dark violet colour, emits its excess of sulphur in sulphurous acid fumes, and sublimes in brilliant red needles without residue. When well prepared, no globules of mercury should be discernible in it upon being viewed with a magnifier; and if rubbed on a gold ring, it should not communicate a white colour. Ivory black is detected in it, by throwing a small portion on a red-hot iron, when a white matter—phosphate of lime—will be left behind. Adulteration by sulphuret of antimony is shown, when muriatic acid boiled on a portion of the powder, acquires the property of causing a precipitate of oxychloride of antimony, upon being added to water. Adopting the views of Mr. Brande, ethiops mineral consists of one equiv. of bisulphuret of mercury, mixed with ten and a half equiv. of sulphur in excess.

Medical Properties and Uses. Ethiops mineral is supposed to be alterative, and as such is sometimes prescribed in glandular affections and cutaneous diseases. It has been given in scrofulous swellings, occurring in children; and from the mildness of its operation has been esteemed well suited to such cases. The dose generally given is from five to thirty grains, repeated several times a day; but it has often been administered in much larger doses, without producing any obvious impression on the system. The late Dr. Duncan stated that he had given it in doses of several drachms for a considerable length of time, with scarcely any effect. B.

HYDRARGYRI SULPHURETUM RUBRUM. *U.S., Lond., Dub.* SULPHURETUM HYDRARGYRI RUBRUM. *Ed.* *Red Sulphuret of Mercury. Cinnabar.*

"Take of Purified Mercury *forty ounces;* Sulphur *eight ounces.* Mix the Mercury with the Melted Sulphur over the fire; and, as soon as the mass begins to swell, remove the vessel from the fire, and cover it with considerable force, to prevent combustion; then rub the mass into powder, and sublime." *U.S.*

The *London* process, which is the original of the above, only differs from it in phraseology.

"Take of Purified Mercury *nineteen parts;* Sublimed Sulphur *three parts.* Mix the Mercury with the melted Sulphur; and if the mixture takes fire, extinguish the flame by covering the vessel. Reduce the mass to powder, and sublime it." *Dub.*

The *Edinburgh College* has given no formula for this preparation, having included it in the list of the Materia Medica.

Mercury and sulphur, when heated together, unite with great energy, and a product is obtained, which by sublimation becomes the red or bisulphuret of mercury. In order to render the combination more prompt, the sulphur is first melted; and the addition of the mercury should be made gradually, while the mixture is constantly stirred. Dr. Barker recommends the addition of the metal, by straining it upon the melted sulphur through a linen cloth, whereby it falls in the form of a shower, in a minutely divided state. When the temperature has arrived at a certain point, the combination takes place suddenly, with a slight explosion, and with the inflammation of the sulphur, which must be extinguished by covering the vessel. A black mass will thus be obtained, containing generally an excess of sulphur, which may be got rid of by gently heating the matter reduced to powder on a sand-bath. After this treatment it is better prepared for being sublimed, as directed by the Pharmacopœias. The sublimation is best performed, on a small scale, in a loosely stopped glass matrass, which should be placed in a crucible containing sand, and, thus arranged, exposed to a red heat. The equivalent quantities for forming this sulphuret, are 32.2 of sulphur, and 202 of mercury.

Preparation on the Large Scale. Cinnabar is seldom or never prepared on a small scale, being made in large quantities for the purposes of the arts; and on these accounts, it is, perhaps, preferably placed in the Materia Medica, as has been done by the Edinburgh College. In Holland, where it is principally manufactured, the sulphur is melted in a cast iron vessel, and the mercury is added in a divided state, by causing it to pass through chamois leather. As soon as the combination has taken place, the iron vessel is surmounted by another, into which the cinnabar is sublimed. In proportion as the quantity of the materials employed in one operation is greater, will the product have a finer tint. It is also important in the manufacture to use the materials pure, and to drive off any uncombined sulphur which may exist in the mass, before submitting it to sublimation.

Properties, &c. Red sulphuret of mercury is in the form of heavy, brilliant, crystalline masses, of a deep red colour and fibrous texture. It is inodorous and tasteless, and insoluble in water and alcohol. It is not acted on by sulphuric, nitric, or muriatic acid, nor by solutions of the caustic alkalies; but is decomposed by nitro-muriatic acid, the chlorine of which unites with its elements, so as to form corrosive sublimate, and chloride of sulphur. When heated in the open air, it is decomposed, the sulphur becoming sulphurous acid, and the mercury being volatilized. In close vessels, at a red heat, it sublimes without fusion, and condenses in a mass composed of a multitude of small needles. When duly levigated, it furnishes a powder of a brilliant red colour, and in this state constitutes the paint called *vermilion*. It occurs native, and forms the principal ore of mercury, and that from which the metal is exclusively extracted. It should not be purchased in powder; as, in that state, it is sometimes adulterated with red lead, dragon's blood, or chalk. If red lead be present, the cinnabar will not be entirely volatile at a red heat. Dragon's blood may be detected by alcohol, which will take up the colouring matter of this vegetable product, if present; and if chalk be mixed with it, effervescence will be excited on the addition of an acid. Red sulphuret of mercury is composed of one equiv. of mercury 202, and two of sulphur 32.2=234.2.

Medical Properties and Uses. Cinnabar was formerly considered to be alterative and anthelmintic, but is at present seldom or never given internally. It is sometimes employed in the way of fumigation, as a rapid sialagogue, in venereal ulcers of the nose and throat, in cases in which it is an object of importance to check the ulceration in the shortest time possible. The dose for internal exhibition is from ten grains to half a drachm, in the form of electuary or bolus. When used by fumigation, half a drachm may be thrown on a red-hot iron, and the fumes inhaled as they arise. These consist of sulphurous acid gas and mercury vapour, the former of which must prove highly irritating to the patient's lungs. A better material for mercurial fumigation is the black or gray protoxide of mercury. B.

HYDRARGYRUM AMMONIATUM. *U.S.* HYDRARGYRUM PRÆCIPITATUM ALBUM. *Lond.* HYDRARGYRI SUBMURIAS AMMONIATUM. *Dub.* *Ammoniated Mercury. White Precipitate.*

"Take of Corrosive Chloride of Mercury [Corrosive Sublimate] *half a pound;* Muriate of Ammonia *four ounces;* Solution of Carbonate of Potassa *half a pint;* Distilled Water *four pints.* Dissolve first the Muriate of Ammonia, then the Chloride of Mercury, in the Distilled Water, and add the Solution of Carbonate of Potassa. Wash the precipitate till it becomes tasteless, and then dry it." *U.S., Lond.*

"Add to the liquor which has been poured off from Precipitated Calomel, as much Water of Caustic Ammonia as may be sufficient completely to precipitate the metallic salt. Wash the precipitate with cold Distilled Water, and dry it on bibulous paper." *Dub.*

In the first of the above processes, the muriate of ammonia and corrosive sublimate being both dissolved in the distilled water, a very soluble double salt is formed in solution, formerly called *sal alembroth.* It may be obtained in crystals by evaporation, and is found to consist of one equiv. of corrosive sublimate and two equiv. of muriate of ammonia. When in solution, it may be considered as a compound of one equiv. of bipermuriate of mercury, and two of muriate of ammonia. Upon the addition of carbonate of potassa to this solution, the carbonic acid is given off, and the mercurial salt decomposed. Two equiv. of potassa combine with the two equiv. of muriatic acid, and remain in solution as muriate of potassa; while the one equiv. of peroxide of mercury precipitates in combination with one equiv. of muriate of ammonia to form the ammoniated mercury, the other equiv. of muriate of ammonia remaining in solution along with the muriate of potassa. This statement is made in accordance with the results of Mr. Hennel of London, who found the preparation under consideration on analysis to consist of one equiv. of peroxide of mercury 218, and one of muriate of ammonia 53.57=271.57. This composition is admitted by Berzelius; and the analysis of Guibourt, who makes the preparation an ammoniacal bichloride, combined with the ammoniaret of the peroxide of mercury, agrees virtually with that of Hennell; as it corresponds with two equiv. of the compound on Hennel's view, *minus* two equiv. of water.

The Dublin formula furnishes another mode of obtaining precisely the same compound, the nature of which has just been explained. The liquor which is poured off from precipitated calomel, consists, as was stated under that preparation, of a solution of corrosive sublimate which, in the dissolved state, is viewed as a bipermuriate of mercury. When ammonia is added to it, two equiv. of the alkali combine with the two equiv. of muriatic acid, and form two equiv. of muriate of ammonia; while the one equiv. of peroxide precipitates in combination with one of the equiv. of muriate of ammonia to form the ammoniated mercury. The process of the Dublin College is advantageous, in so far as it usefully employs the residuary liquor derived from another formula, and which would otherwise be lost. Indeed, it may be stated that the best way of making this preparation is to form an aqueous solution of corrosive sublimate, and to precipitate it with ammonia.

Properties, &c. Ammoniated mercury is a light, perfectly white powder, insoluble in water and alcohol, and having a taste, at first earthy and afterwards metallic. The caustic fixed alkalies unite with the muriatic acid, disengage the ammonia, and set the peroxide free. When exposed to heat it is decomposed, and resolved into water, nitrogen, ammonia, and protochloride of mercury or calomel. If adulterated with white lead or chalk, the fraud may be detected by exposing a sample of the preparation to a strong red heat, when these impurities will remain. Should starch be mixed with it, a charry residuum will be obtained on the application of heat. The nature of this preparation was long involved in doubt; and admitting the composition assigned to it by Mr. Hennell, it is not easy to give it a name which will accurately express its constituents. Under these circumstances, perhaps, the name given to it in the U. S. Pharmacopœia is as little liable to objection as any other that could be selected; and it has in its favour the precedent of the analogous names of *ammoniated copper* and *ammoniated iron.*

Medical Properties and Uses. Ammoniated mercury is used only in the form of ointment as an external application.

Off. Prep. Unguentum Hydrargyri Ammoniati, *U. S., Lond., Dub.* B.

HYDRARGYRUM CUM CALCIS CARBONATE. *U.S.* HYDRARGYRUM CUM CRETA. *Lond., Dub. Mercury with Carbonate of Lime. Mercury with Chalk.*

"Take of Purified Mercury *three ounces;* Prepared Carbonate of Lime [Prepared Chalk, *Lond.*] *five ounces.* Rub them together till all the globules disappear." *U.S., Lond.*

The *Dublin College* prepares it in the same manner as *Mercury with Magnesia,* only substituting precipitated carbonate of lime for carbonate of magnesia.

When mercury is triturated with certain dry and pulverulent substances, such as chalk or magnesia, it gradually loses its fluidity and metallic lustre, and assumes the form of a blackish or dark gray powder. A similar change takes place when it is rubbed with viscid or greasy substances, such as honey or lard. The globules in either case entirely disappear, so as not to be visible even through a good lens; and the mercury is said to be extinguished. It was formerly thought that the metal was oxidized in the process, and that the medical activity of the preparation depended on the presence of the black or protoxide of mercury. At present, however, the change is generally attributed solely to the mechanical division of the metal, which in this state is supposed to be capable of acting on the system. In relation to the preparation under consideration, Mr. Phillips observes, that the mercury is wholly insoluble in acetic acid, and therefore is not in the state of protoxide. He suggests, however, that it may be in the form of a suboxide; as, when the chalk has been separated by acetic acid, the mercury does not form a fluid mass, but exists in separate and minute globules.

Medical Properties and Uses. This preparation is a very mild mercurial, similar in its properties to the blue pill, but much weaker. It is sometimes used as an alterative, particularly in the complaints of children, attended with deficient biliary secretion, indicated by white or clay-coloured stools. The chalk is antacid, and, though in small quantity, may sometimes be a useful accompaniment of the mercury in diarrhœa. Eight grains of the preparation, according to the U.S. and London Pharmacopœias, contain three grains of mercury. The dose is from five grains to half a drachm twice a day. W.

HYDRARGYRUM CUM MAGNESIA. *Dub. Mercury with Magnesia.*

"Take of Purified Mercury, Manna, each, *two parts;* Carbonate of Magnesia *one part.* Rub the Mercury with the Manna in an earthenware mortar, dropping in sufficient water to give to the mixture the consistence of syrup, and continue the trituration till the globules disappear. Then add, still rubbing, an eighth part of the Carbonate of Magnesia; and when this is well mixed with the other ingredients, add sixteen parts of hot water, and agitate the mixture. Let this stand for some time that the sediment may subside, and then decant the fluid. Repeat the washing twice, that the whole of the Manna may be removed; and with the sediment, while it is still moist, mix the remainder of the Carbonate of Magnesia. Lastly, dry the powder on bibulous paper." *Dub.*

The use of the manna in this process is merely to facilitate the extinction of the mercury, as it is wholly washed away, and the metal is left mixed with magnesia. The preparation has the same virtues with the preceding, but may be preferably used in the complaints of children attended with constipation. W.

INFUSA.

Infusions.

These are aqueous solutions obtained by treating with water, without the aid of ebullition, vegetable products which are only partly soluble in that liquid. The water employed may be hot or cold according to the objects to be accomplished. Infusions are generally prepared by pouring boiling water upon the vegetable substance, and macerating in a lightly closed vessel till the liquid cools. The soluble principles are thus extracted more rapidly, and, as a general rule, in larger proportion than at a lower temperature. Some substances, moreover, are dissolved in this manner, which are nearly or quite insoluble in cold water. A prolonged application of heat is in some instances desirable; and this may be effected by placing the vessel near the fire. Cold water is preferred, when the active principle is highly volatile, or when any substance of difficult solubility at a low temperature exists in the vegetable, which it is desirable to avoid in the infusion. A longer continuance of the maceration is necessary in this case; and, in warm weather, there is sometimes danger that spontaneous decomposition may commence before the process is completed. The water employed should be free from saline impurities, which frequently produce precipitates, and render the infusion turbid. Fresh river, rain, or distilled water is usually preferable to that of pumps or springs.

The substance to be acted on should be sliced or bruised, or employed in the state of powder; but this last condition is seldom requisite, and is always inconvenient, as it requires that the infusion should be filtered through paper in order completely to separate the undissolved portion. In other cases, it is sufficient to strain through fine linen. Infusions are usually prepared in glazed earthenware or porcelain vessels fitted with covers. Mr. Brande suggests the use of clean metallic vessels, which when finely polished retain the heat for a greater length of time; but they are also more liable to chemical alteration, and may sometimes injuriously affect the preparation.

As infusions do not keep well, especially in warm weather, they should be made extemporaneously and in small quantities. In this country they are usually prepared in families, and the propriety of their introduction into the Pharmacopœia has been doubted; but it is desirable to have certain fixed standards for the convenience of the medical practitioner; and it is sometimes convenient to direct infusions from the apothecary, for whose guidance officinal formulæ are necessary. Physicians would, indeed, find their advantage in more frequently directing them from the shops, instead of leaving their preparation to the carelessness or want of skill of the attendants upon the sick.

As we have already treated of the chemical relations and medical properties of the substances used in infusion, it would be useless repetition to enlarge upon these points in the following details. We shall touch upon them only in cases of peculiar interest, or where changes requiring particular notice may grow out of the nature of the process. W.

INFUSUM ANGUSTURÆ. *U. S., Dub.* INFUSUM CUSPARIÆ. *Lond. Infusion of Angustura Bark.*

"Take of Angustura Bark, bruised, *half an ounce;* Boiling Water *a pint.* Macerate for two hours in a covered vessel, and strain." *U. S.*

The *London* and *Dublin Colleges* direct two drachms to half a pint, and proceed as above.

The dose of the infusion is two fluidounces repeated every two, three, or four hours. W.

INFUSUM ANTHEMIDIS. *U. S., Lond.* INFUSUM ANTHEMIDIS NOBILIS. *Ed.* INFUSUM CHAMÆMELI. *Dub.* *Infusion of Chamomile.*

"Take of Chamomile *half an ounce;* Boiling Water *a pint.* Macerate for ten minutes in a covered vessel, and strain." *U. S.*

The *London College* orders two drachms of the flowers to half a pint of boiling water, and proceeds as above; the *Edinburgh* directs two drachms to eight ounces of cold water, and macerates for twenty-four hours; the *Dublin* agrees with the London in the proportion of the ingredients, and with the Edinburgh in the period of digestion.

The infusion of chamomile has the odour and taste of the flowers. It affords precipitates with gelatin, yellow Peruvian bark, sulphate of iron, tincture of muriate of iron, nitrate of silver, corrosive chloride of mercury, and the acetates of lead. (*London Dispensatory.*) As a tonic it is given cold in the dose of two fluidounces several times a day. To assist the operation of emetic medicines it should be administered in the tepid state, and in large draughts. The infusion prepared by maceration in cold water is more grateful to the palate and stomach than that made with boiling water, but is less efficient as an emetic. W.

INFUSUM ARMORACIÆ. *U. S.* INFUSUM ARMORACIÆ COMPOSITUM. *Lond., Dub.* *Infusion of Horse-radish.*

"Take of Horse-radish [fresh root], sliced, Mustard [seed], bruised, each, *an ounce;* Boiling Water *a pint.* Macerate for two hours in a covered vessel and strain." *U.S.*

The *London College* adds to the infusion, prepared as above directed, a fluidounce of the compound spirit of horse-radish. The process of the *Dublin College* differs from that of the London only in requiring a maceration of six instead of two hours.

This infusion is rendered turbid by the deposition of vegetable albumen, and in warm weather speedily runs into the putrefactive fermentation. It affords precipitates with the infusion of galls and of Peruvian bark, with the alkaline carbonates, nitrate of silver, and corrosive chloride of mercury. (*London Dispensatory.*) It has the stimulant properties of its two active ingredients, and is occasionally used in paralytic and dropsical affections attended with general debility. The dose is about two fluidounces three or four times a day. W.

INFUSUM AURANTII COMPOSITUM. *Lond., Dub.* *Compound Infusion of Orange Peel.*

"Take of Dried Orange Peel *two drachms;* fresh Lemon Peel *a drachm;* Cloves, bruised *half a drachm;* Boiling Water *half a pint.* Macerate for a quarter of an hour in a covered vessel, and strain." *Lond., Dub.*

This infusion is given as a grateful stomachic in the dose of two or three fluidounces. W.

INFUSUM BUCHU. *Dub.* *Infusion of Buchu.*

"Take of Buchu Leaves *half an ounce;* Boiling Water *half a pint.* Digest for four hours, and strain through linen." *Dub.*

This infusion has the odour and taste, and the medical virtues of the leaves; and affords a convenient mode of administering the medicine. The dose is one or two fluidounces. W.

INFUSUM CARYOPHYLLORUM. *Lond., Dub.* *Infusion of Cloves.*

"Take of Cloves, bruised, *a drachm;* Boiling Water *half a pint.* Macerate for two hours in a covered vessel, and strain." *Lond., Dub.*

The infusion of cloves affords precipitates with lime-water, and with the soluble salts of iron, zinc, lead, silver, and antimony. (*Phillips.*) The dose is about two fluidounces. W.

INFUSUM CASCARILLÆ. *U.S., Lond., Dub.* *Infusion of Cascarilla.*

"Take of Cascarilla, bruised, *an ounce;* Boiling Water *a pint.* Macerate for two hours in a covered vessel, and strain." *U.S.*

The *London* and *Dublin Colleges* direct half an ounce of the bark to half a pint of boiling water, and proceed as above.

This infusion affords precipitates with lime-water, infusion of galls, nitrate of silver, acetate and subacetate of lead, sulphate of zinc, and sulphate of iron. (*London Dispensatory.*) The medium dose is two fluidounces. W.

INFUSUM CATECHU COMPOSITUM. *Lond., Dub.* INFUSUM ACACIÆ CATECHU. *Ed.* *Compound Infusion of Catechu.*

"Take of Extract of Catechu *two drachms and a half;* Cinnamon Bark, bruised, *half a drachm;* Boiling Water *half a pint.* Macerate for an hour in a covered vessel, and strain." *Lond.* "Digest for an hour in a covered vessel, and strain through linen." *Dub.*

The *Edinburgh College* orders the same quantities of catechu and cinnamon, but directs them to be macerated in seven ounces of boiling water for two hours, and an ounce of simple syrup to be added to the strained infusion.

This is an elegant mode of administering catechu. The dose is from one to three fluidounces, repeated three or four times a day, or more frequently. W.

INFUSUM CINCHONÆ. *U. S., Lond. Dub.* INFUSUM CINCHONÆ LANCIFOLIÆ. *Ed.* *Infusion of Peruvian Bark.*

"Take of Peruvian Bark, bruised, *an ounce;* Boiling Water *a pint.* Macerate for two hours in a covered vessel, and strain." *U.S.*

"Take of Bark of the Cinchona lancifolia [pale bark], bruised, *half an ounce;* Boiling Water *half a pint.* Macerate for two hours in a lightly covered vessel, and strain." *Lond.*

"Take of Bark of the Cinchona lancifolia, in powder, *an ounce;* Water [cold] *a pound.* Macerate for twenty-four hours in a lightly covered vessel, with occasional agitation, and filter." *Ed.*

"Take of Bark of the Cinchona lancifolia, in coarse powder, *an ounce;* Cold Water *twelve fluidounces.* Triturate the Bark with a little of the Water, and add the remainder during the trituration. Macerate for twenty-four hours, with frequent agitation, and decant the clear liquor." *Dub.*

We can discover no good reason for the exclusive employment by the British Colleges of the pale bark in the preparation of this infusion. The U.S. Pharmacopœia, wisely we think, leaves the particular variety to the choice of the physician.

Though the infusion with boiling water, as directed by the U.S. and London Pharmacopœias, is more quickly prepared than the cold infusion of the Edinburgh and Dublin Colleges, and therefore better adapted to cases of emergency, yet the latter is a more elegant preparation, not turbid like the former, and at least equally efficient. The trituration directed by the Dublin College facilitates the process, by thoroughly wetting the powder, and thus enabling it to be more readily diffused through the liquid. We have been much in the habit of using the cold infusion prepared with the addition of a fluidrachm of aromatic sulphuric acid to the ingredients, and have found it very effectual. The addition of the acid ensures the solution of all or nearly all the quinia and cinchonia. We have always preferred the red bark, as abounding most in the active principles.

The former edition of the U.S. Pharmacopœia directed three other infusions of cinchona, one with lime-water, a second with magnesia, and a third with lemon-juice. Of these, the first two are obviously improper preparations; as the lime and magnesia decompose the salts of quinia and cinchonia, and precipitate the alkaline bases. In the third, on the contrary, the lemon-juice promotes the solubility of the active principles, and is therefore a useful addition, though, as it is not always applicable, it may, with propriety be left to extemporaneous prescription. These preparations have been omitted in the last edition.

The infusion of cinchona affords precipitates with the alkalies, alkaline carbonates, and alkaline earths; the soluble salts of iron, zinc, and silver; corrosive chloride of mercury, arsenious acid, and tartar emetic; gelatinous solutions; and various vegetable infusions and decoctions, as those of galls, chamomile, columbo, cascarilla, horse-radish, cloves, catechu, orange-peel, foxglove, senna, rhubarb, valerian, and simaruba. In some instances the precipitate occurs immediately, in others not for several hours. (*London Dispensatory.*) Few, however, of these substances diminish the efficacy of the infusion, as they do not affect the active principles. The alkalies, alkaline earths, and vegetable astringents are really incompatible. The same is said to be the case with tartaric and oxalic acids, and the soluble tartrates and oxalates.

The infusion of cinchona may be advantageously administered in cases which require tonic treatment, but do not call for the full powers of the bark. The medium dose is two fluidounces to be repeated three or four times a day, or more frequently in acute diseases. W.

INFUSUM COLOMBÆ. *U.S., Ed., Dub.* INFUSUM CALUMBÆ. *Lond.* *Infusion of Columbo.*

"Take of Columbo, sliced, *half an ounce;* Boiling Water *a pint.* Macerate for two hours in a covered vessel, and strain." *U.S.*

The *London* and *Dublin Colleges* direct two drachms of columbo to half a pint of boiling water; the *Edinburgh*, one drachm to eight ounces; and all proceed as above.

This infusion is not disturbed by the salts of iron, and may be conveniently administered in connexion with them. It very soon spoils. The dose is two fluidounces three or four times a day. W.

INFUSUM DIGITALIS. *U.S., Lond., Dub.* INFUSUM DIGITALIS PURPUREÆ. *Ed.* *Infusion of Foxglove.*

"Take of Foxglove [dried leaves] *a drachm;* Boiling Water *half a pint;* Tincture of Cinnamon *a fluidounce.* Macerate the Foxglove with the Water for four hours in a covered vessel, and strain; then add the Tincture of Cinnamon." *U.S.*

The *London* and *Dublin* processes correspond with the above, except that half a fluidounce of the *spirit* of cinnamon is employed instead of a fluidounce of the *tincture.* The *Edinburgh College* takes a drachm of the leaves, eight ounces of boiling water, and an ounce of the spirit of cinnamon; and having macerated the leaves in the water for four hours, adds the spirit, and strains.

This infusion is essentially the same with that employed by Withering. It affords precipitates with the sulphate of iron, acetate of lead, and infusion of Peruvian bark. (*London Dispensatory.*) The dose is half a fluidounce, repeated twice a day under ordinary circumstances, every eight hours in urgent cases, until the system is affected. W.

INFUSUM EUPATORII PERFOLIATI. *U.S. Infusion of Thoroughwort.*

"Take of Thoroughwort [the dried herb] *an ounce;* Boiling Water *a pint.* Macerate for two hours in a covered vessel, and strain." *U.S.*

As a tonic, this infusion should be taken cold in the dose of two fluidounces three or four times a day, or more frequently; as an emetic and diaphoretic, in large tepid draughts. W.

INFUSUM GENTIANÆ COMPOSITUM. *U.S., Lond., Ed., Dub. Compound Infusion of Gentian.*

"Take of Gentian, bruised, *half an ounce;* Orange Peel [dried peel of the Seville orange], bruised, Coriander, bruised, each, *a drachm;* Diluted Alcohol *four fluidounces;* Water [cold] *twelve fluidounces.* First pour on the Alcohol, and three hours afterwards, the Water; then macerate for twelve hours, and strain." *U.S.*

The above was copied from the *Edinburgh* formula, which differs only in designating the quantity of diluted alcohol and of water in troy ounces instead of fluidounces.

The *London* and *Dublin Colleges* employ the following formula. "Take of Gentian Root, sliced, Dried Orange Peel, each, *a drachm;* Fresh Lemon Peel *two drachms* [*one drachm*, Dub.]; Boiling Water *twelve fluidounces.* Macerate for an hour in a lightly covered vessel, and strain."

The U.S. and Edinburgh infusion differs materially from the London and Dublin. The former has three times as much gentian in proportion to the solvent as the latter, and is therefore a much stronger bitter; while, by the use of cold instead of boiling water, less of the inert mucilaginous matter is extracted. The use of the diluted alcohol is to assist in dissolving the bitter principle, and at the same time to contribute towards the preservation of the infusion, which, without this addition, is very apt to spoil. The preparation, however, may be considered rather in the light of a very weak tincture than of an infusion, and should be used accordingly.

The dose of the infusion of the U.S. Pharmacopœia is a fluidounce, that of the preparation of the London College two or three fluidounces, to be repeated three or four times a day. W.

INFUSUM LINI. *U.S.* INFUSUM LINI COMPOSITUM. *Lond., Dub.* INFUSUM LINI USITATISSIMI. *Ed. Infusion of Flaxseed.*

"Take of Flaxseed *half an ounce;* Liquorice Root, bruised, *two drachms;* Boiling Water *a pint.* Macerate for four hours in a covered vessel, and strain." *U. S.*

The *London* and *Dublin Colleges* direct an ounce of flaxseed, *bruised,* half an ounce of liquorice root, *sliced,* and two pints of boiling water; the *Edinburgh,* an ounce of flaxseed, two drachms of liquorice root, *bruised,* and two pounds of boiling water; all complete the process in the manner directed in the U.S. Pharmacopœia.

This is a useful demulcent drink in inflammatory affections of the mucous membrane of the lungs and urinary passages. It may be taken *ad libitum.* W.

INFUSUM MENTHÆ SIMPLEX. *Dub.* *Simple Infusion of Mint.*

"Take of the Dried Leaves of Spearmint *two drachms;* Boiling Water a sufficient quantity to afford *six ounces* [fluidounces] of strained liquor." *Dub.*

This is common mint tea, and may be taken *ad libitum.* W.

INFUSUM MENTHÆ COMPOSITUM. *Dub.* *Compound Infusion of Mint.*

"Take of the Dried Leaves of Spearmint *two drachms;* Boiling Water a sufficient quantity to afford *six ounces* [fluidounces] of strained liquor. Digest for half an hour in a covered vessel, and strain the liquor when cold; then add, of Refined Sugar *two drachms,* Oil of Spearmint *three drops* dissolved in *half an ounce* [fluidounce] of Compound Tincture of Cardamom." *Dub.*

This is an agreeable aromatic infusion, useful in allaying nausea and vomiting, and affording an eligible vehicle for unpleasant medicines. The dose is one or two fluidounces frequently repeated. W.

INFUSUM PRUNI VIRGINIANÆ. *U.S.* *Infusion of Wild-cherry Bark.*

"Take of Wild-cherry Bark, bruised; *half an ounce;* Water [cold] *a pint.* Macerate for twelve hours, and strain." *U.S.*

This is a useful addition to the infusions first adopted as officinal in the former edition of the U.S. Pharmacopœia. It is a peculiarly suitable object for officinal direction, as, in consequence of the volatile nature of one of its active ingredients, it is better prepared with cold water than in the ordinary mode. The period of maceration might with propriety be extended to twenty-four hours, or even longer in cold weather. The infusion, which is beautifully transparent, has the colour of Madeira wine, and the pleasant bitterness and peculiar flavour of the bark. The dose is two or three fluidounces three or four times a day, or more frequently when a strong impression is required. W.

INFUSUM QUASSIÆ. *U.S., Lond., Dub.* INFUSUM QUASSIÆ EXCELSÆ. *Ed.* *Infusion of Quassia.*

"Take of Quassia, rasped, *two drachms;* Water [cold] *a pint.* Macerate for twelve hours, and strain." *U.S.*

The *London* and *Dublin Colleges* order a scruple of quassia, half a pint of *boiling water,* and maceration for two hours in a covered vessel. The *Edinburgh College* proceeds in the same way, employing half a drachm of quassia and eight ounces of boiling water.

The proportion of quassia directed in the British Pharmacopœias is much too small. The infusion of the London and Dublin Colleges contains the strength of only two grains and a half of quassia in a fluidounce, that of the Edinburgh College, three grains and three-quarters in an ounce; while the dose of quassia in substance is from twenty grains to a drachm, and of the extract not less than five grains. We, therefore, prefer the proportions directed by our national Pharmacopœia. Boiling water may be employed when it is desirable to obtain the preparation quickly; but cold water affords a clearer infusion. The dose is two fluidounces three or four times a day. W.

INFUSUM RHEI. *U.S., Lond., Ed., Dub.* *Infusion of Rhubarb.*

"Take of Rhubarb, sliced, *a drachm;* Boiling Water *half a pint.* Macerate for two hours in a covered vessel, and strain." *U.S., Lond., Dub.*

"Take of Russian Rhubarb, bruised, *half an ounce;* Boiling Water *eight ounces;* Spirit of Cinnamon *an ounce.* Macerate the Rhubarb with the Water, in a close vessel, for twelve hours; then add the Spirit, and strain." *Ed.*

In the latter process there is a great waste of a costly medicine, the Russian Rhubarb commanding a very high price. We greatly prefer the first formula. In order, however, that the rhubarb may be exhausted, the maceration should be conducted near the fire at a temperature somewhat less than that of boiling water. It is customary to add some aromatic, such as cardamom, fennel-seed, or nutmeg, which improves the taste of the infusion, and renders it more acceptable to the stomach. One drachm of either of these spices may be digested in connexion with the rhubarb.

This infusion may be given as a gentle laxative, in the dose of one or two fluidounces, every three or four hours, till it operates. It is occasionally used as a vehicle of tonic, antacid, or more active cathartic medicines. The stronger acids, and most metallic solutions, are incompatible with it. W.

INFUSUM ROSÆ COMPOSITUM. *U.S., Lond.* INFUSUM ROSÆ GALLICÆ. *Ed.* INFUSUM ROSÆ ACIDUM. *Dub.* *Compound Infusion of Roses.*

"Take of Red Roses [dried petals] *half an ounce;* Boiling Water *two pints and a half;* Diluted Sulphuric Acid *three fluidrachms;* Sugar [refined] *an ounce and a half.* Pour the Water upon the Roses in a glass vessel; then add the Acid, and macerate for half an hour; lastly, strain the liquor and add the Sugar." *U.S., Lond.*

The *Dublin* process corresponds with the above, except that the petals are directed without their claws, and three pints of water are employed instead of two pints and a half. The *Edinburgh College* directs an ounce of the dried petals, two pounds and a half of boiling water, half an ounce of sulphuric acid, and an ounce of white sugar; macerates the petals with the water for four hours in an earthen vessel not glazed with lead; then adds the acid, and having strained the liquor, dissolves the sugar in it.

The red roses serve little other purpose than to impart a fine red colour and a slight astringent flavour to the preparation, which owes its medicinal virtues almost exclusively to the sulphuric acid. It is refrigerant and astringent, and affords a useful and not unpleasant drink in hemorrhages and colliquative sweats. It is much used by British practitioners as a vehicle for saline medicines; particularly sulphate of magnesia, the taste of which it serves to cover. It is also employed as a gargle, usually in connexion with acids, nitre, alum, or tincture of Cayenne pepper. The dose is from two to four fluidounces. W.

INFUSUM SARSAPARILLÆ COMPOSITUM. *Dub.* *Compound Infusion of Sarsaparilla.*

"Take of Sarsaparilla Root, previously cleansed with cold water and sliced, *an ounce;* Lime-water *a pint.* Macerate for twelve hours in a covered vessel, with occasional agitation, and strain." *Dub.*

From the experiments of M. Soubeiran it appears, that, by maceration in cold water for twenty-four hours, the active principle of sarsaparilla is extracted as effectually as by infusion in boiling water and digestion for two hours, and that in either case the infusion is stronger than the decoction; but the aqueous preparation which he found to possess most of the sensible properties of the root, was made by infusing in water the spirituous extract obtained according to the process of M. Beral. (See page 842.) In all his experiments, M. Soubeiran employed the same proportions of the root and of water. (*Journ. de Pharm.* xvi. 43.) A cold infusion of sarsaparilla may be considered an eligible preparation; but no advantage can result from the use of lime-water, as directed by the Dublin College. From two to four fluidounces of the infusion may be taken three times a day. W.

INFUSUM SENNÆ. *U.S.* INFUSUM SENNÆ COMPOSITUM. *Lond., Dub.* INFUSUM CASSIÆ SENNÆ. *Ed.* *Infusion of Senna.*

"Take of Senna *an ounce;* Coriander [seed], bruised, *a drachm;* Boiling Water *a pint.* Macerate for an hour in a covered vessel, and strain." *U.S.*

The *London College* orders an ounce and a half of senna, a drachm of sliced ginger-root, and a pint of boiling water; the *Edinburgh*, six drachms of senna, a scruple of ginger, and nine ounces of boiling water; and the *Dublin*, an ounce of senna, a drachm of ginger, and a pint of boiling water; all macerate as above directed.

We decidedly prefer the formula of the U.S. Pharmacopœia. The proportions of senna directed by the London and Edinburgh Colleges, are unnecessarily and wastefully large; and coriander is a better addition than ginger to an infusion very often given in inflammatory affections. This infusion deposites, on exposure to the air, a yellowish precipitate, which is said to aggravate its griping tendency; it should, therefore, not be made in large quantities. It is customary to connect with it manna and some one of the neutral salts, which both increase its efficacy and render it less painful in its operation. The following is a good formula for the preparation of senna tea. Take of senna *half an ounce;* sulphate of magnesia, manna, each, *an ounce;* fennel seed *a drachm;* boiling water *half a pint.* Macerate in a covered vessel till the liquid cools. One-third may be given for a dose, and repeated every four or five hours till it operates.

The dose of the infusion of the U.S. Pharmacopœia is about four fluidounces. W.

INFUSUM SENNÆ CUM TAMARINDIS. *Dub.* INFUSUM SENNÆ COMPOSITUM. *Ed.* *Infusion of Senna with Tamarinds.*

"Take of Preserved Tamarinds *an ounce;* Senna Leaves *a drachm;* Coriander Seeds, bruised, *a drachm;* Brown Sugar *half an ounce;* Boiling Water *eight ounces.* Macerate for four hours, with occasional agitation, in a closed earthen vessel, not glazed with lead, and strain.

"It may also be made with double, triple, &c, the quantity of senna." *Ed.*

The process of the *Dublin College* corresponds closely with the above. In this infusion, the unpleasant taste of the senna is covered by the acidity of the tamarinds and sweetness of the sugar. It is aperient and refrigerant, and is well adapted to febrile complaints when a laxative operation is desired. The dose is from two to four fluidounces. W.

INFUSUM SERPENTARIÆ. *U.S.* *Infusion of Virginia Snakeroot.*

"Take of Virginia Snakeroot *half an ounce;* Boiling Water *a pint.* Macerate for two hours in a covered vessel, and strain." *U.S.*

The proportion of serpentaria in this infusion, as directed in the first edition of the U.S. Pharmacopœia, was twice as great as that now ordered; but it may be doubted whether the preparation was much stronger. A pint of water does not extract all the virtues of an ounce of the root, at least in the time specified by the Pharmacopœia. The infusion, as at present directed, is quite strong enough. The dose is one or two fluidounces, repeated every two hours in low forms of fever, but less frequently in chronic affections. W.

INFUSUM SIMAROUBÆ. *Lond.* INFUSUM SIMARUBÆ. *Dub.* *Infusion of Simaruba.*

"Take of Simaruba Bark, bruised, *half a drachm;* Boiling Water *half a pint.* Macerate for two hours in a covered vessel, and strain." *Lond., Dub.*

This is a feeble preparation, and little, if at all used in the United States. The dose is two fluidounces. W.

INFUSUM SPIGELIÆ. *U.S.* *Infusion of Pink-root.*

"Take of Pink-root *half an ounce;* Boiling Water *a pint.* Macerate for two hours in a covered vessel, and strain." *U.S.*

The dose of this infusion for a child two or three years old, is from four fluidrachms to a fluidounce; for an adult, from four to eight fluidounces, repeated morning and evening. A quantity of senna equal to that of the spigelia, is usually added in order to ensure a cathartic effect. W.

INFUSUM TABACI. *U.S., Lond., Dub.* *Infusion of Tobacco.*

"Take of Tobacco *a drachm;* Boiling Water *a pint.* Macerate for an hour in a covered vessel, and strain." *U.S., Lond., Dub.*

This is used only in the form of enema in strangulated hernia, obstinate colic, and retention of urine from spasm of the urethra. Only half of the pint should be employed at once; and if this should not produce relaxation in half an hour, the remainder may be injected. Fatal consequences have resulted from too free a use of tobacco in this way. W.

INFUSUM ULMI. *U.S.* *Infusion of Slippery Elm Bark.*

"Take of Slippery Elm Bark, sliced, *an ounce;* Boiling Water *a pint.* Macerate for twelve hours in a covered vessel, and strain." *U.S.*

The period of maceration is unnecessarily long, unless cold water is employed. This infusion may be used *ad libitum*, as a demulcent and nutritious drink in catarrhal and nephritic diseases, and in inflammatory affections of the intestinal mucous membrane. W.

INFUSUM VALERIANÆ. *U.S., Dub.* *Infusion of Valerian.*

"Take of Valerian *half an ounce;* Boiling Water *a pint.* Macerate for an hour in a covered vessel, and strain." *U.S.*

The *Dublin College* directs two drachms of valerian, in coarse powder, seven fluidounces of boiling water, digestion for an hour, and straining after the liquid has become cold.

The dose of this infusion is two fluidounces, repeated three or four times a day, or more frequently. W.

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LINIMENTA.

Liniments.

These are preparations intended for external use, of such a consistence as to render them conveniently applicable to the skin by gentle friction with the hand. They are usually thicker than water, but thinner than the ointments; and are always liquid at the temperature of the body.

LINIMENTUM AMMONIÆ. *U.S., Dub.* LINIMENTUM AMMONIÆ FORTIUS. *Lond.* OLEUM AMMONIATUM. *Ed.* *Liniment of Ammonia.*

"Take of Water of Ammonia *half a fluidounce;* Olive Oil *two fluidounces.* Mix them." *U.S.*

The *London College* directs a fluidounce of "Solution of Ammonia" to two fluidounces of olive oil; the *Edinburgh*, one part of "Water of Ammonia" to eight parts of olive oil; the *Dublin*, two fluidrachms of "Water of Caustic Ammonia" to two fluidounces of the oil.

The proportions of the alkali to the oil, directed by the several Pharmacopœias, though very different, are not so much so in reality as they appear to be; the water of ammonia being strongest in those instances where the quantity is least. In our Pharmacopœia, a mean proportion between the two extremes has been wisely adopted. In this preparation, the ammonia unites with the oil to form a soap, which is partly dissolved, partly suspended in the water, producing a white opaque emulsion. This liniment is an excellent rubefacient, frequently employed in inflammatory affections of the throat, catarrhal and other pectoral complaints of children, and in rheumatic pains. It is applied by rubbing it gently upon the skin, or placing a piece of flannel saturated with it over the affected part. Should it occasion too much inflammation, as sometimes happens, it must be diluted with oil. W.

LINIMENTUM AMMONIÆ SUBCARBONATIS. *Lond.* *Liniment of Subcarbonate of Ammonia.*

"Take of Solution of Subcarbonate of Ammonia *a fluidounce;* Olive Oil *three fluidounces.* Shake them together until they unite." *Lond.*

In this instance, as in the preceding, a kind of fluid soap is formed; but the union between the oil and alkali is less perfect, and after a short time the soapy matter separates from the water. The preparation is therefore less elegant; and as the end which it was probably intended to answer of affording a milder rubefacient, may be obtained by diluting the liniment of ammonia with olive oil, there seems to be no good reason for retaining it among the officinal remedies. W.

LINIMENTUM CALCIS. *U.S., Dub.* OLEUM LINI CUM CALCE, sive LINIMENTUM AQUÆ CALCIS. *Ed.* *Liniment of Lime.*

"Take of Lime-water, Flaxseed Oil, each, *a fluidounce.* Mix them." *U. S.*

The *Edinburgh College* directs equal parts of the same ingredients; the *Dublin*, three fluidounces of lime-water, and three fluidounces of olive oil.

The lime forms a soap with the oil, of which there is a great excess, that separates upon standing. Olive oil, as directed by the Dublin College, is often substituted for that of flaxseed; but possesses no other advantage over it than that of having a less unpleasant odour. This is a very useful liniment in recent burns and scalds. It is sometimes called *Carron oil*, from having been much employed at the iron works of that name in Scotland. W.

LINIMENTUM CAMPHORÆ. *U.S. Lond.* OLEUM CAMPHORATUM. *Ed., Dub.* *Camphor Liniment.*

"Take of Camphor *half an ounce;* Olive Oil *two fluidounces.* Dissolve the Camphor in the Oil." *U.S., Lond.*

The *Edinburgh* and *Dublin Colleges* direct one part of camphor to eight of olive oil.

This is employed as an anodyne embrocation in sprains, bruises, rheumatic or gouty affections of the joints, and other local pains. It is also supposed to have a discutient effect when rubbed upon glandular swellings. W.

LINIMENTUM CAMPHORÆ COMPOSITUM. *Lond., Dub. Compound Camphor Liniment.*

"Take of Camphor *two ounces;* Solution of Ammonia *six fluidounces;* Spirit of Lavender *a pint.* Mix the Solution of Ammonia with the Spirit in a glass retort; then, with a gentle heat, distil a pint; lastly, dissolve the Camphor in the distilled liquor." *Lond., Dub.*

This preparation deserves a place rather among the Spirits or Tinctures than the Liniments. The distillation is an unnecessary refinement, as the ingredients may be immediately united; and the quantity of water contained in the solution of ammonia cannot materially diminish the efficacy of the liniment. Indeed, if prepared with the water of ammonia of the U.S. Pharmacopœia, it would be too stimulant without dilution. It is used as a rubefacient, and at the same time anodyne embrocation, in local pains, particularly of a rheumatic character. W.

LINIMENTUM CANTHARIDIS. *U.S. Liniment of Spanish Flies.*

"Take of Spanish Flies, in powder, *an ounce;* Oil of Turpentine *half a pint.* Digest for three hours in a water-bath, and strain." *U.S.*

The oil of turpentine is an excellent solvent of the active principle of cantharides, and when impregnated with it, acquires in addition to its own rubefacient properties, those of a powerful epispastic. In the first edition of the Pharmacopœia, the directions were to simmer for three hours; but as the flies are injured by a heat above that of boiling water, the use of the water-bath is now ordered. This liniment was introduced into notice by Dr. Joseph Hartshorne of Philadelphia, who employed it with great advantage as an external stimulant in the prostrate states of typhus fever. Caution, however, is necessary in its use, both to graduate its strength to the circumstances of the case, and not to apply it very extensively, lest it may produce severe and troublesome, if not dangerous vesication. (See *Eclectic Repertory*, vol. i. p. 94.) If too powerful in its undiluted state, it may be weakened by the addition of olive or linseed oil. W.

LINIMENTUM HYDRARGYRI. *Lond. Liniment of Mercury.*

"Take of Stronger Mercurial Ointment, Prepared Lard, each *four ounces;* Camphor *an ounce;* Rectified Spirit *fifteen minims;* Solution of Ammonia *four fluidounces.* Rub the Camphor first with the Spirit, then with the Lard and Mercurial Ointment; lastly, add gradually the Solution of Ammonia, and mix the whole." *Lond.*

This is a stimulant liniment, employed for the discussion of chronic glandular swellings and venereal tumours, and to promote the absorption of collections of fluid. It is said to be more apt to salivate than mercurial ointment. One drachm of it is to be rubbed upon the affected part night and morning. W.

LINIMENTUM SAPONIS CAMPHORATUM. *U.S. Camphorated Soap Liniment. Opodeldoc.*

"Take of Common Soap *three ounces;* Camphor *an ounce;* Oil of Rosemary, Oil of Origanum, each, *a fluidrachm;* Alcohol *a pint.* Dissolve the Camphor and Oils in the Alcohol; then add the Soap, and digest, by means of a sand-bath, till it is dissolved. This Liniment, when cold, is of the consistence of a soft ointment." *U.S.*

This preparation is directed only by the U.S. Pharmacopœia. It differs from the common soap liniment (*Tinctura Saponis Camphorata*) chiefly in being prepared with common white soap, made with animal fat, instead of Castile soap, which is made with olive oil. The latter will not coagulate upon cooling like the former, and is therefore unfit for the preparation of this liniment, which is intended to be in the solid state. It is customary, after the solution of the soap has been effected, to pour the liquid into small wide-mouthed glass bottles, containing about four fluidounces, in which it solidifies into a soft, semitransparent, uniform, yellowish-white mass. This liniment melts with the heat of the body, and therefore becomes liquid when rubbed upon the skin. It is much used, under the common name of *opodeldoc*, as an anodyne application in sprains, bruises, and rheumatic pains.

LINIMENTUM SIMPLEX. *Ed.* *Simple Liniment.*

"Take of Olive Oil *four parts;* White Wax *one part.* Melt the Wax in the Oil with a gentle heat, then stir the mixture well till it becomes stiff on cooling." *Ed.*

This is little employed. It may be used for keeping the skin soft and smooth in cold weather.

Off. Prep. Unguentum Oxidi Zinci, *Ed.;* Unguentum Oxidi Zinci Impuri, *Ed.* W.

LINIMENTUM TEREBINTHINÆ. *U.S., Lond., Dub.* *Liniment of Turpentine.*

"Take of Oil of Turpentine *half a pint;* Resin Cerate *a pound.* Add the Oil of Turpentine to the Cerate, previously melted, and mix them." *U.S., Lond., Dub.*

This is the liniment originally proposed by Dr. Kentish, and subsequently so highly lauded as a remedy in burns and scalds. It should be applied as soon after the occurrence of the accident as possible, and should be suspended when the peculiar inflammation excited by the fire is removed. The best mode of application is to cover the burned or scalded surface with pledgets of patent lint saturated with the liniment. It should not be allowed to come in contact with the sound parts. W.

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MAGNESIA.

Preparations of Magnesia.

MAGNESIA. *U.S., Lond., Ed., Dub.* *Magnesia.*

"Take of Carbonate of Magnesia *any quantity.* Put it into an earthen vessel, and expose it to a red heat for two hours, or till the addition of Vinegar produces no effervescence." *U.S.*

"Take of Subcarbonate of Magnesia *four ounces.* Heat it intensely for two hours, or until Diluted Acetic Acid dropped upon it excites no effervescence." *Lond.*

"Let Carbonate of Magnesia be exposed, in a crucible, to a red heat for two hours; then let it be kept in well stopped vessels." *Ed.*

"Take of Carbonate of Magnesia *any quantity.* Put it into a crucible, and subject it to a strong heat for two hours. When the Magnesia has become cool, preserve it in a glass vessel." *Dub.*

By exposure to a red heat, the water and carbonic acid of the carbonate of magnesia are expelled, and the earth is obtained pure. According to Dr. Black, the carbonate loses seven-twelfths of its weight by calcination. Brande says that the loss varies from 50 to 60 per cent. of which from 15 to 20 per cent. is water. About the close of the process the earth exhibits a luminous or phosphorescent appearance, which is said to be a good criterion of its freedom from carbonic acid. (*Duncan.*) A more certain indication, however, is the absence of effervescence when muriatic acid is added to a little of the magnesia, previously mixed with water. It is an error to suppose that a very intense heat is requisite in the calcination. The temperature of ignition is sufficient for the expulsion of the water and carbonic acid, and any increase serves only to render the magnesia harder, denser, less readily soluble in acids, and consequently less useful as a medicine. In order to ensure a pure product, care should be taken that the carbonate employed be free from lime. It should be rubbed to powder before being introduced into the pot or crucible; and as in consequence of its levity it occupies a very large space, the plan has been proposed of moistening and compressing it in order to reduce its bulk. The magnesia may thus be obtained of greater density; but this is an equivocal recommendation; and the French pharmaceutical writers direct, that the vessels employed should be sufficiently large to contain a considerable quantity of the carbonate, without the necessity of resorting to compression. The officinal direction, to keep the magnesia, after it has been prepared, in well stopped glass vessels, is founded on the fact that it absorbs carbonic acid and water from the air; but the absorption goes on slowly, and the caution is often neglected in the shops. Its great bulk renders its introduction into small bottles inconvenient. A four ounce bottle holds only about an ounce of the purest and finest magnesia. But its specific gravity is greatly increased by trituration; and four times the quantity may thus be got into the same space. (*Journ. of the Phil. Col. of Pharm.* iii. 198.) The density of *Henry's magnesia*, which is at least four times that of the earth prepared in the ordinary way, has been ascribed to this cause. It has also been attributed to the influence of intense heat employed in the calcination; and both causes may contribute to it. The conjecture has even been advanced, that this magnesia, which has enjoyed so great a popularity in England and this country, is prepared by precipitating a solution of sulphate of magnesia by caustic potassa, as the earth afforded by this plan is comparatively dense. It is difficult to find any reasonable ground for the preference given to Henry's magnesia. If its density be owing to the employment of an intense heat in the calcination, it is rather an objection than otherwise, as its solubility in acids is thus diminished. In France the earth is esteemed in proportion to its levity. It is asserted that the magnesia, prepared from the carbonate procured by precipitating the sulphate of magnesia with carbonate of soda, is softer to the touch, and bears a closer resemblance to Henry's than that prepared from the ordinary carbonate. The fact is explained by the presence in common magnesia of a little sulphate of potassa, from which it is difficult entirely to free it in consequence of the sparing solubility of this salt, and of a portion of silica which originally existed in the carbonate of potassa employed to decompose the sulphate of magnesia, and of which the carbonate of soda is destitute.

Properties, &c. Pure magnesia is in the state of a very light, white, inodorous powder, of a feeble alkaline taste. Its sp. gr. is commonly stated at 2.3. It was deemed infusible, till melted by means of the compound blowpipe of Dr. Hare. Water sprinkled upon it is absorbed to the extent of about 18 per cent., but with scarcely any increase of temperature. It is almost insoluble, requiring, according to Dr. Fyfe, 5142 parts of water at 60°, and 36,000 parts of boiling water for solution. Water thus impregnated has no effect on vegetable colours, but magnesia itself produces a brown stain by contact with moistened turmeric paper. Magnesia is a metallic oxide, consisting of one equivalent of magnesium 12.7, and one equiv. of oxygen 8=20.7. *Magnesium* is a white, very brilliant metal, resembling silver, malleable, fusible at a low temperature, and convertible into magnesia by the combined action of air and moisture. There is a hydrate of magnesia, consisting of one equiv. of the earth and one of water.

Lime is the most common impurity in the magnesia of the shops, to which it imparts a more strongly alkaline and more disagreeable taste. It may be detected by the precipitate which it affords when oxalate of ammonia is added to a neutral solution of the magnesia in a diluted acid.

Magnesia forms with nitric and muriatic acids, salts which are soluble in alcohol and very deliquescent. It is precipitated from its saline solutions by the pure alkalies in the state of a hydrate, and by the carbonates of potassa and soda as a carbonate; but it is not precipitated by the alkaline bicarbonates nor by common carbonate of ammonia.

Medical Properties and Uses. It is antacid and laxative; and is much employed, under the name of *calcined magnesia*, in dyspepsia, sick headach, gout, and other complaints attended with sour stomach and constipation. It is also a favourite remedy in the complaints of children in which acidity of the primæ viæ is often a prominent symptom. Its antacid properties render it very useful in gravel attended with an excessive secretion of uric acid. Its advantages over carbonate of magnesia are that it may be given in a smaller dose, and does not occasion flatulence. The dose as a laxative is from thirty grains to a drachm, as an antacid merely, or antilithic, from ten to thirty grains twice a day. When it meets with no acid, it is apt to linger in the stomach or bowels, and should in this case be followed by lemonade. It should be administered in water or milk, and should be thoroughly triturated so as to render the mixture uniform. W.

MAGNESIÆ SULPHAS PURUM. *Dub.* *Pure Sulphate of Magnesia.*

"Take of Commercial Sulphuric Acid *twenty-five parts;* Water *one hundred parts;* Carbonate of Magnesia *twenty-four parts*, or as much as may be sufficient to saturate the Acid. Mix the Sulphuric Acid and Water, and then gradually add the Carbonate of Magnesia. Lastly, evaporate the filtered liquor, so that crystals may form when it cools." *Dub.*

The sulphate of magnesia prepared in the large way is sufficiently pure for medical purposes; and the above process is, therefore, superfluous. W.

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MELLITA.

Preparations of Honey.

Honey is used in pharmacy only as the vehicle of more active medicines. It is said to have this advantage over syrup, that its preparations are less apt to become candied; but as it contains principles which disagree with the stomachs of many persons, and as its variable consistence prevents the same exact precision in regard to proportion as is attainable with a solution of pure sugar, it is at present little employed. The preparations in which honey and vinegar are combined, are called *Oxymels*.

Medicated honeys are of a proper consistence, if, when a small quantity, allowed to cool upon a plate, is divided by the edge of a spoon, the portions do not readily coalesce. A more accurate criterion, however, is their specific gravity, which should be 1.319 (35° B.) at ordinary temperatures, and 1.261 (30° B.) at the boiling point of water. W.

MEL DESPUMATUM. *U. S., Lond., Ed., Dub. Clarified Honey.*

"Take of Honey *any quantity.* Melt it by means of a water-bath, and then remove the scum." *U.S., Lond., Ed., Dub.*

Honey by the heat of the water-bath becomes so fluid, that the wax and other lighter impurities which it contains rise to the surface, and may be skimmed off; while the heavier substances which may have been accidentally or fraudulently added, such as sand or other earth, sink to the bottom.

The following method of clarifying honey is commonly practised in France. Take of white honey 3000 parts; water 750 parts; carbonate of lime, powdered and washed, 96 parts. Mix them in a suitable vessel, and boil for three minutes, stirring constantly. Then add 96 parts of animal charcoal previously washed, heated to redness, powdered, and sifted, and boil for a few minutes. Lastly, add the whites of two eggs beat up with 500 parts of water, and bring the liquid to the boiling point. Withdraw the vessel from the fire, and after the mixture has cooled for fifteen minutes, strain it through flannel, and repeat the straining till the liquid passes perfectly clear. Should it not have the proper consistence, it should be concentrated sufficiently by a quick boiling.

The following process for clarifying common honey was proposed by M. Borde, and approved by the Society of Pharmacy at Paris. Take of common honey 5000 parts; vegetable charcoal, in powder, 320 parts; animal charcoal, in powder, 160 parts; nitric acid of 30° or 32° Baumé 40 parts; water 320 parts. Rub the two kinds of charcoal in a porcelain mortar, with the water and acid; then add the honey, and put the whole into a tinned pan. Place the vessel over the fire, and allow it to remain for eight or ten minutes without suffering it to boil; then add 1600 parts of milk in which the white of an egg has been beaten, and boil for four or five minutes. Remove the liquid from the fire, and pass it through a strainer in a warm place, repeating the straining if the first portions are not clear. Of the nitric acid employed in the process, a portion is saturated by the lime of the animal charcoal, and the remainder unites with the caseous matter of the milk, which it thus causes to coagulate: none remains in the honey. (*Dict. des Drogues.*)

Honey clarified by these processes is as clear and colourless as syrup made with sugar, but still retains a peculiar flavour. It is less disposed to ferment than crude honey, and is said not to be so liable to produce griping pain when swallowed.

Off. Prep. Confectio Rutæ, *Lond., Dub.;* Linimentum Æruginis, *Lond.;* Mel Boracis, *Lond., Ed., Dub.;* Mel Rosæ, *Lond., Ed., Dub.;* Mel Scillæ Compositum, *U.S.;* Oxymel, *Ed., Dub., Lond.;* Oxymel Colchici, *Dub.;* Oxymel Scillæ, *U.S., Lond., Dub.* W.

MEL BORACIS. *Lond., Dub.* MEL SUB-BORATIS SODÆ. *Ed. Honey af Borax.*

"Take of Subborate of Soda, in powder, *a drachm;* Clarified Honey *an ounce.* Mix them." *Lond., Dub.*

"Take of Sub-Borate of Soda, in powder, *one part;* Clarified Honey *eight parts.* Mix them." *Ed.*

This preparation might well be left to extemporaneous prescription. It is used in aphthous ulcerations of the mouth. W.

MEL ROSÆ. *Lond., Dub.* MEL ROSÆ GALLICÆ, *Ed. Honey of Roses.*

"Take of Petals of the Red Rose, dried, *four ounces;* Boiling Water *three pints;* Clarified Honey *five pounds.* Macerate the Petals in the Water for six hours, and strain; then add the Honey, and by means of a water-bath, boil the liquor down to the proper consistence." *Lond.*

The *Edinburgh College* directs *an ounce* of the red rose leaves, dried, *a pound* of boiling water, and *sixteen ounces* of clarified honey; and proceeds as above, without using the water bath. The *Dublin College* employs the same proportions with the London, but uses unclarified honey, and directs that the scum which rises during the boiling should be removed.

We prefer the process of the London College. The preparation has the flavour of the rose with its slight astringency, and forms a pleasant addition to the gargles employed in inflammation and ulceration of the mouth and throat. W.

MEL SCILLÆ COMPOSITUM. *U.S.* *Compound Honey of Squill. Hive-Syrup.*

"Take of Squill bruised, Seneka bruised, each, *four ounces;* Tartrate of Antimony and Potassa *forty eight grains;* Clarified Honey *two pounds;* Distilled Water *four pints.* Pour the Distilled Water upon the Squill and Seneka, and boil to one half; strain, and add the Clarified Honey; then boil down to three pints, in which dissolve the Tartrate of Antimony and Potassa." *U. S.*

This is the preparation commonly known by the name of *Coxe's Hive Syrup.* The degree of evaporation directed by the Pharmacopœia is insufficient, and it has been found that the resulting preparation invariably ferments. It measures only 20½° Baumé, a degree of concentration which is by no means sufficient for syrups, and still less so for the preparations of honey. If boiled down to two pints instead of three, it will have a suitable consistence, measuring 30° Baumé, and will be found to keep much better. In this case, in order to preserve the due proportion of tartar emetic, only thirty-two grains should be added.

The compound honey of squill combines the virtues of seneka, squill, and tartar emetic, of the last of which it contains one grain in every fluidounce. It is emetic, diaphoretic, expectorant, and frequently cathartic; and may be given with advantage in mild cases of croup, in the latter stages of severe cases when the object is to promote expectoration, and in other pectoral affections in which the same indication is presented. As an emetic in inflammatory croup and infantile catarrh, we decidedly prefer a simple solution of tartar emetic in water. The dose of the compound honey of squill is for children from ten drops to a fluidrachm, according to the age, and should be repeated in cases of croup every fifteen or twenty minutes till it operates. As an expectorant for adults the dose is twenty or thirty drops. W.

OXYMEL. *Ed., Dub.* OXYMEL SIMPLEX. *Lond.* *Oxymel.*

"Take of Clarified Honey *three pounds;* Diluted Acetic Acid [Distilled Vinegar] *two pints.* Boil them down in a glass vessel, with a gentle heat, to the proper consistence." *Lond.*

The *Edinburgh College* orders three parts of clarified honey, and two parts of distilled vinegar, and proceeds as above. The *Dublin College* takes two pounds of crude honey, and a pint of distilled vinegar; and boils them to the consistence of syrup, removing the scum as it rises.

This mixture of honey and vinegar forms a pleasant addition to gargles, and is sometimes used as a vehicle of expectorant medicines, and to impart flavour to drinks in febrile complaints. W.

OXYMEL COLCHICI. *Dub.* *Oxymel of Meadow Saffron.*

"Take of the fresh Bulb of Meadow Saffron, cut into thin slices, *an ounce;* Distilled Vinegar *a pint;* Clarified Honey *two pounds.* Macerate the Meadow Saffron with the Vinegar, in a glass vessel, for forty-eight hours. Strain the liquor, with strong expression, from the Bulb, and add the Honey. Lastly, boil the mixture, frequently stirring it with a spatula, to the consistence of a syrup." *Dub.*

This preparation is seldom used in this country, and could not indeed be conveniently prepared, according to the above directions, as we have not the fresh bulbs. It is in no respect superior to the wine of colchicum, by which it has been superseded. The dose is a fluidrachm, repeated twice a day, and gradually increased till it produces the desired effect. W.

OXYMEL CUPRI SUBACETATIS. *Dub.* LINIMENTUM ÆRUGINIS. *Lond.* *Oxymel of Subacetate of Copper.*

"Take of Verdigris, in powder, (Prepared Subacetate of Copper, *Dub.*) *an ounce;* Vinegar (Distilled Vinegar, *Dub.*) *seven fluidounces;* Clarified Honey *fourteen ounces.* Dissolve the Verdigris in the Vinegar, and strain the solution through linen; then gradually add the Honey, and boil down to a proper consistence." *Lond., Dub.*

This is an external stimulant and escharotic, and was formerly called *mel Ægyptiacum.* It is employed either undiluted or mixed with some mild ointment, to destroy fungous granulations, or repress their growth. In the latter state, it is a useful stimulant to flabby, indolent, and ill conditioned ulcers; and largely diluted with water has been used as a gargle in venereal ulcerations of the mouth and throat. W.

OXYMEL SCILLÆ. *U.S., Lond., Dub.* *Oxymel of Squill.*

"Take of Clarified Honey *three pounds;* Vinegar of Squill *two pints.* Boil them in a glass vessel, by means of a water-bath, to a proper consistence." *U.S.*

The *London* and *Dublin* processes differ from the above only in boiling over a gentle fire, instead of by means of a water-bath.

This preparation has the virtues of squill, but is not superior in any respect to the syrup, while it is of a less definite strength, in consequence of the want of precision in the degree of evaporation. Prepared according to the directions of the London and Dublin Colleges, it would be very liable to be injured by heat. It is chiefly used as an expectorant in chronic catarrh, humoral asthma, hooping cough, and generally in those states of the pulmonary organs in which the bronchial tubes are loaded with a viscid mucus of difficult expectoration. The dose is from one to two fluidrachms. In large doses it is emetic, and as such may sometimes be given with advantage in infantile croup and catarrh. W.

MISTURÆ.

Mixtures.

This term is applied, in the language of pharmacy, to those preparations in which insoluble substances, whether solid or liquid, are suspended in watery fluids by the intervention of gum Arabic, sugar, the yolk of eggs, or other viscid matter. When the suspended substance is of an oleaginous nature, the mixture is sometimes called an *emulsion.* The object of these preparations is usually to facilitate the administration, to conceal the taste, or to obviate the nauseating effects of unpleasant medicines; and their perfection depends upon the intimacy with which the ingredients are blended. Some skill and care are requisite to the production of a uniform and perfect mixture. As a general rule, the body to be suspended should be thoroughly mixed by trituration with the substance intended to act as the intermedium, before the watery vehicle is added. In the case of the liquid balsams and oils, if gum Arabic be employed as the intermedium, it should be previously brought to the state of mucilage of the consistence directed in the U.S. Pharmacopœia. The white of eggs is frequently ordered by physicians as the suspending substance, but it is inferior for this purpose to the yolk, or to gum Arabic. When the white is used it should be previously well beaten, and incorporated with the oleaginous or balsamic substance before the water is added.* Mixtures are generally the objects of extemporaneous prescription; but a few have been deemed of sufficient importance to merit a place in the Pharmacopœias. They should be prepared only when wanted for use. W.

MISTURA AMMONIACI. *U.S., Lond., Dub. Ammoniac Mixture.*

"Take of Ammoniac *two drachms;* Water *half a pint.* Rub the Ammoniac with the Water gradually added, until they are thoroughly mixed." *U.S., Lond.*

The *Dublin College* directs a drachm of ammoniac to be rubbed with eight fluidounces of pennyroyal water, and the mixture to be strained through linen.

In this mixture the insoluble part of the ammoniac is suspended by means of the gum, imparting a milky appearance to the preparation, which, from this circumstance, was formerly called *lac ammoniaci.* The greater portion of the resin subsides upon standing. The mixture is slightly curdled by acids. The dose is from one to two tablespoonfuls. W.

MISTURA AMYGDALÆ. *U.S.* MISTURA AMYGDALARUM. *Lond.* EMULSIO ACACIÆ ARABICÆ. *Ed.* EMULSIO ARABICA. *Dub. Almond Mixture.*

"Take of Almond Confection *an ounce;* Distilled Water *half a pint.* Rub the Confection with the Water gradually added, until they are thoroughly mixed; then strain." *U.S.*

The *London College* directs the same ingredients, but in double the quantity, and proceeds in the same manner as above.

"Take of Mucilage of Gum Arabic *two ounces;* Almonds *an ounce;* Refined Sugar *half an ounce;* Water *two pounds and a half.* Blanch the almonds by steeping them in hot water and peeling them; then beat them diligently in a stone mortar, first with the Sugar, and afterwards with the Mucilage, gradually adding the Water; lastly, strain through linen." *Ed.*

"Take of Gum Arabic, in powder, *two drachms;* Sweet Almonds, blanched, Refined Sugar, each, *half an ounce;* Water *a pint.* Dissolve the Gum in the heated Water, and when the solution is almost cold, gradually pour it upon the Almonds, previously well beaten with the Sugar, triturating at the same time so as to form an emulsion; then strain." *Dub.*

EMULSIO AMYGDALI COMMUNIS. *Ed.* MISTURA AMYGDALARUM. *Dub. Almond Emulsion.*

"Take of Sweet Almonds *an ounce;* Refined Sugar *half an ounce;* Water

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* For some good practical observations upon the preparation of mixtures, the reader is referred to a communication published in the Journal of the Philadelphia College of Pharmacy, vol. iv. p. 11, by W. Hodgson, Jun.

two pounds and a half. Blanch the Almonds by steeping them for a short time in hot water, and peeling them; then beat them diligently with the Sugar in a stone mortar, gradually adding the Water; and strain the liquor." *Ed.*

"Take of Sweet Almonds, blanched, *an ounce and a half;* Bitter Almonds *two scruples;* Refined Sugar *half an ounce;* Water *two pints and a half.* Triturate the Almonds with the Sugar, adding the water by degrees, and strain." *Dub.*

As the almond mixture of the U.S. and London Pharmacopœias is prepared from the almond confection which contains gum Arabic, it arranges itself with the Arabic emulsion of the Edinburgh and Dublin Colleges; while the almond emulsion of the Edinburgh College, and the almond mixture of the Dublin, containing no gum Arabic, properly come together. All the preceding preparations, however, may be considered as identical in properties; for the gum Arabic is, like almonds, merely demulcent; and the proportion of bitter almonds in the mixture of the Dublin College is too small to produce any sensible effect on the system.

The oleaginous matter of the almonds is suspended, by means of their albumen and gum, in the water, forming a milky emulsion. When the almonds themselves are employed, as in the Edinburgh and Dublin processes, care should be taken to reduce them to the consistence of a paste previously to the addition of the water; and with each successive portion of fluid a uniform mixture should be formed, before another portion is added. The use of the confection, as directed in the U.S. and London Pharmacopœias, very much facilitates the process. Common water, when not very impure, may be properly substituted for the distilled. Great care should be taken to select the almonds perfectly free from rancidity. The mixture is not permanent. Upon standing, the oil rises like thick cream to the surface, and the separation is effected more quickly by heat, alcohol, and the acids, which coagulate the albumen. The preparation, in warm weather, soon becomes sour, and unfit for use.

The almond mixture has a bland taste, and may be used as a pleasant demulcent in catarrhal and dysenteric affections, and irritation or inflammation of the urinary passages. To be of any service it must be freely employed. From two to eight fluidounces may be taken at once. It is occasionally employed as the vehicle of less pleasant medicines; but should not be used in connexion with any considerable quantity of tinctures, acidulous salts, or other substances containing an excess of acid.

A preparation from almonds much employed in Europe, and sometimes in this country, is the *syrup of orgeat*, which is directed to be made in the following manner by the French Codex. "Take of sweet almonds, blanched, 500 parts; bitter almonds, blanched, 250 parts; refined sugar 875 parts. Beat them together for a long time in a marble mortar, with a wooden pestle, gradually adding 125 parts of water, so as to form a soft and homogeneous mass. Dilute the mass thus formed with 1,875 parts of water, so as to form an emulsion; then strain with expression, and to the strained liquor add 2,500 parts of refined sugar. Heat the mixture over a gentle fire, stirring constantly, till the sugar is dissolved; then strain, and to the syrup when nearly cold, add 96 parts of orange flower water, or 16 parts of the tincture of lemon-peel." This syrup is used as a demulcent and gentle anodyne in coughs and nervous irritations, and in order to flavour drinks and mixtures. It may be given in the dose of an ounce. W.

MISTURA ASSAFŒTIDÆ, *U.S.*, *Lond.* MISTURA ASSÆFŒTIDÆ. *Dub.* *Assafetida Mixture.*

"Take of Assafetida *two drachms;* Water *half a pint.* Rub the Assafetida with the Water gradually added, until they are thoroughly mixed." *U.S.*, *Lond.*

The *Dublin College* directs one drachm of assafetida and eight fluidounces of pennyroyal water.

This mixture, from its whiteness and opacity, is frequently called *lac assafœtidæ*, or milk of assafetida. It is, as a general rule, the best form for the administration of this antispasmodic, being less stimulant than the tincture, and more prompt in its action than the pill. Its excessively disagreeable smell and taste are, however, objections, which induce a frequent preference of the last mentioned preparation. It is very often employed as an enema. The dose is from one to two tablespoonfuls, frequently repeated. From two to four fluidounces may be given by the rectum. W.

MISTURA CALCIS CARBONATIS. *U.S.* MISTURA CRETÆ. *Lond.*, *Dub.* POTIO CARBONATIS CALCIS. *Ed.* *Mixture of Carbonate of Lime. Chalk Mixture.*

"Take of Prepared Carbonate of Lime [prepared chalk] *half an ounce;* Sugar [refined], Gum Arabic in powder, each, *two drachms;* Cinnamon Water, Water, each, *four fluidounces.* Rub them together till they are mixed." *U.S.*

The *London College* orders half an ounce of prepared chalk, three drachms of refined sugar, half an ounce of powdered gum Arabic, and a pint of water. The formula of the *Dublin College* is the same, except that an ounce of mucilage of gum Arabic is substituted for the half ounce of gum in powder. The *Edinburgh College* takes an ounce of prepared carbonate of lime, half an ounce of refined sugar, and two ounces of mucilage of gum Arabic; and having rubbed them together, adds gradually two pounds and a half of water, and two ounces of spirit of cinnamon.

We prefer the process of the U.S. Pharmacopœia. The mixture of the London and Dublin Colleges is without any aromatic addition; that of the Edinburgh College is in too large a quantity.

This mixture is a convenient form for administering chalk, and is much employed in looseness of the bowels accompanied with acidity. Laudanum and kino or catechu are very often added to increase its astringency. The dose is a tablespoonful frequently repeated. W.

MISTURA CAMPHORÆ CUM MAGNESIA. *Dub.* *Mixture of Camphor with Magnesia.*

"Take of Camphor *twelve grains;* Carbonate of Magnesia *half a drachm;* Water *six ounces* [fluidounces.] Triturate the Camphor with the Magnesia, adding the Water gradually, and mix." *Dub.*

This differs from the *Aqua Camphoræ* of the U.S. Pharmacopœia, in which, though the camphor is dissolved by the intervention of magnesia, the latter is afterwards separated by filtration. In the above mixture the carbonate of magnesia is retained; and an anodyne, antacid, and laxative draught is formed, which, though it may sometimes be given with advantage, hardly deserves a place among the officinal preparations. W.

MISTURA CORNU USTI. *Lond.* *Mixture of Burnt Hartshorn.*

"Take of Burnt Hartshorn *two ounces;* Gum Arabic *an ounce;* Water *three pints.* Boil down to two pints, constantly stirring, and strain. *Lond.*

This formula is altogether absurd. The phosphate of lime, which constitutes almost the whole of the burnt hartshorn, is insoluble in water hot or cold, and might be suspended by means of gum Arabic without boiling. It is, moreover, quite inert as a medicine. W.

MISTURA FERRI AROMATICA. *Dub.* *Aromatic Mixture of Iron.*

"Take of Crown Bark, in coarse powder, *an ounce;* Columbo Root, sliced, *three drachms;* Cloves, bruised, *two drachms;* Iron Filings *half an ounce.* Digest for three days in a close vessel, with occasional agitation, with such a quantity of Peppermint Water as will yield a mixture of twelve ounces after filtration; then add, of Compound Tincture of Cardamom *three ounces;* Tincture of Orange Peel *three drachms.*" *Dub.*

This is an aromatic infusion of Peruvian bark and columbo, and has not the slightest claim to the title given it in the Pharmacopœia, as it contains but a very small proportion of iron, and that in a state of solution, not of mixture. In consequence of the action of some of the vegetable principles upon the filings, enough of the metal is taken up to impart a greenish-black colour to the liquor; but the quantity is not appreciable, as the filings seem to be scarcely diminished by the process. The preparation may be given as a tonic in the dose of one or two fluidounces. W.

MISTURA FERRI COMPOSITA. *U.S., Lond., Dub.* *Compound Mixture of Iron.*

"Take of Myrrh, in powder, *a drachm;* Carbonate of Potassa, *twenty-five grains;* Rose Water *half a pint;* Sulphate of Iron, in powder, *a scruple;* Spirit of Lavender *half a fluidounce;* Sugar [refined] *a drachm* Rub together the Myrrh, Carbonate of Potassa, and Sugar, and during the trituration, add gradually, first the Rose Water and Spirit of Lavender, and lastly the Sulphate of Iron. Pour the mixture immediately into a glass bottle, which is to be well stopped." *U.S.*

"Take of Myrrh, in powder, *a drachm;* Subcarbonate of Potassa [Carbonate of Potassa] *twenty-five grains;* Rose Water *seven fluidounces and a half;* Sulphate of Iron, in powder, *a scruple;* Spirit of Nutmeg *half a fluidounce;* Refined Sugar *a drachm.* Rub the Myrrh with the Spirit of Nutmeg and Subcarbonate of Potassa; and to these, while rubbing, add first the Rose Water with the Sugar, and then the Sulphate of Iron. Put the mixture immediately into a suitable glass vessel, and stop it." *Lond., Dub.*

This is very nearly the same with the celebrated tonic or antihectic myrrh mixture of Dr. Griffith. The sulphate of iron is decomposed by the carbonate of potassa, with the production of sulphate of potassa and protocarbonate of iron; while the excess of the alkaline carbonate forms a saponaceous compound with the myrrh. The mixture is at first of a greenish colour, which it loses upon exposure to the air, in consequence of the conversion of the protoxide of Iron of the protocarbonate into the red or peroxide. It may, however, be kept for some time without change, if the vessel in which it is contained be well closed; but the best plan is to prepare it only when it is wanted for use. The finest pieces of myrrh in lump should be selected, and rubbed down for the occasion with a little of the rose water, as the powdered myrrh of the shops is often impure, and does not make a good mixture.

It is a good tonic in debility of the digestive organs, especially when attended with derangement of the menstrual function. Hence it is used with advantage in chlorosis and hysterical affections. It is also much employed in the hectic fever of phthisis and chronic catarrh. It is contra-indicated by the existence of inflammation of the gastric mucous membrane. The dose is one or two fluidounces two or three times a day. W.

MISTURA GUAIACI. *Lond.* *Mixture of Guaiac.*

"Take of Guaiacum Gum-resin *a drachm and a half;* Refined Sugar *two drachms;* Mucilage of Gum Arabic *two fluidrachms;* Cinnamon Water *eight fluidounces.* Rub the Guaiac with the Sugar, then with the mucilage, and to these, while rubbing, add gradually the Cinnamon Water." *Lond.*

From one to three tablespoonfuls of this mixture may be given for a dose, and repeated two or three times a day, or more frequently. W.

MISTURA MOSCHI. *Lond.* *Musk Mixture.*

"Take of Musk, Gum Arabic, in powder, Refined Sugar, each, a *drachm;* Rose Water *six fluidounces.* Rub the Musk with the Sugar, then with the Gum, adding gradually the Rose Water." *Lond.*

The musk should be thoroughly rubbed with the gum and sugar before the addition of the water. The mixture will be more permanent if made with twice the quantity of gum directed. The dose is a fluidounce. W.

MORPHIA.

Preparations of Morphia.

MORPHIA. *U.S.* *Morphia.*

"Take of Opium, sliced, *a pound;* Distilled Water *six pints;* Alcohol *a gallon;* Water of Ammonia *six fluidounces.* Macerate the Opium with four pints of the Distilled Water, in a glass vessel, for six days, frequently stirring; then filter through paper. Wash the residue with the remainder of the Water, and filter as before. Mix the filtered liquors, and add first five pints of the Alcohol, and afterwards three fluidounces of the Water of Ammonia, previously mixed with half a pint of the Alcohol. After twenty-four hours, pour in the rest of the Water of Ammonia, mixed, as before, with half a pint of the Alcohol, and set the liquor aside for a day, that crystals may form. To purify these, boil them with the remainder of the Alcohol till they are dissolved, filter the solution while hot, and set it aside to crystallize." *U.S.*

The process for procuring morphia will be better understood by a previous acquaintance with the properties and chemical relations of this principle.

Morphia crystallizes in the form of small, colourless, shining crystals, which appear to be rectangular prisms, and contain 6.33 per cent. of water. It is inodorous and bitter. Exposed to a moderate heat it loses the crystalline form, becoming white and opaque. At a higher temperature it melts, forming a yellowish liquid, which becomes white and crystalline upon cooling. Heated in the open air it burns with a bright flame. It is insoluble in cold water, soluble in rather less than 100 parts of water at 212°, slightly soluble in cold alcohol, and freely so in boiling alcohol, which precipitates it upon cooling. It is dissolved also by the fixed and volatile oils, but very slightly if at all by ether. Its solution restores the blue colour of litmus paper reddened by acids, and turns the yellow of turmeric to brown. With the acids it forms salts, which are generally soluble; and are decomposed by the alkalies. The solutions of potassa and soda are also capable of dissolving morphia, which is precipitated slowly on exposure to the air, in consequence of the absorption of carbonic acid. Aqua ammoniæ has to a certain extent the same solvent power; and hence the necessity, in precipitating morphia by this alkali, not to employ it in great excess. Morphia and its salts, by the contact of nitric acid, assume a blood-red colour, which ultimately changes to yellow. When added to a solution of iodic acid, or an acidulous iodate, they redden the liquid and set iodine free. (*Serullas.*) According to Robinet, they assume a fine blue colour with the salts of the peroxide of iron, especially the permuriate. Morphia is precipitated from its solutions, according to Dublanc, by the infusion of galls, but not by pure gallic acid. (*Journ. de Pharm.* xvi. 429.) Wittstock, on the contrary, states that the salts of morphia are not disturbed by the infusion of galls when entirely pure; but yield a precipitate if contaminated with the smallest proportion of narcotin. (*Berzelius, Traité de Chimie*, v. 132.) The ultimate constituents of morphia, are oxygen, hydrogen, carbon, and nitrogen. Liebig gives 10.33 and 75.38 as the mutually saturating quantities of sulphuric acid and anhydrous morphia; which makes the equivalent of this alkali 292.6.

Various processes for preparing morphia have been proposed. In most of them the morphia is extracted from the opium either in the state of meconate, or in combination with some acid added to the menstruum; is precipitated from its solution by ammonia or magnesia; and is then purified by the agency of alcohol, or by repeated solution in a dilute acid and precipitation. The processes may be considered under three heads; 1st, those in which ammonia is employed as the precipitant, and alcohol as the agent of purification; 2d, those in which magnesia is used instead of ammonia; and 3d, those in which the alkali is obtained pure without the agency of alcohol.

1. Sertürner made an infusion of opium in distilled water, precipitated the morphia by ammonia in excess, dissolved the precipitate in dilute sulphuric acid, precipitated anew by ammonia, and purified by solution in boiling alcohol and crystallization.

The process of M. Hottot, considerably followed in France, is a modification of that of Sertürner. It is as follows: "Take of commercial opium 1000 parts; macerate it in sufficient cold water to exhaust it; unite the infusions; evaporate till the liquor is at 2° Baumé; pour into it when half cooled sufficient ammonia to render the liquid neutral or slightly alkaline, about 8 parts [10 parts of the aqua ammoniæ of the U.S. Pharmacopœia]; allow the fatty matter to subside; decant, and add anew 64 parts of liquid ammonia [about 85 parts of the aq. am. of the U.S. Pharm.]; set aside the liquor for 12 hours; throw the precipitate which forms upon a filter; wash it with cold water; then treat it with 3000 parts of alcohol of 34° Baumé, and 64 parts of animal charcoal; heat the mixture in a water-bath, and filter it while boiling hot. When the liquor cools the morphia will be precipitated in crystals." (*Journ. de Pharm.* x. 479.) The alcohol may be purified by distillation, and an additional quantity of morphia may thus be obtained. In this process, the object of the first addition of ammonia is to separate the fatty matter, which might otherwise embarrass the subsequent steps of the operation. The necessity for a second solution in alcohol, or a solution in diluted sulphuric acid and precipitation, is thus avoided; but it has been asserted that considerable morphia is associated with the fatty matter, and that loss is thereby incurred.

The process of the U.S. Pharmacopœia is an improvement upon the above, and is essentially the same with that of Dr. Edward Staples, published in the Journal of the Philadelphia College of Pharmacy, Vol. 1. p. 15. Without repeating a description of the process, we shall make such remarks upon its several steps, as appear to us likely to be of practical advantage. The employment of water as the solvent is justified by the almost universal practice. It is true, that Sertürner sometimes employed dilute acetic acid, and Vogel states that the product thus obtained is much greater than when water alone is used. Dr. Staples, also, recommends diluted vegetable acids in the treatment of opium of medium quality. But when the opium is properly comminuted, either by being reduced to a coarse powder when dry, or by being finely sliced, in its ordinary state, water alone will be found sufficiently to extract the morphia, by a protracted digestion, such as that directed in the Pharmacopœia. The acids have this disadvantage, that they dissolve more of the narcotina than pure water, and thus render the ultimate product more impure; for the narcotina which is originally taken up continues associated with the morphia in all the subsequent steps of the process. It has been proposed to expose the opium to fermentation with water and yeast, in order to facilitate the extraction of the morphia. By this plan M. Blondeau succeeded in procuring more of the alkaline principle than he could obtain by the ordinary mode; and his results were confirmed by the experiments of MM. Robiquet and Guibourt. According to these latter chemists, no alcohol is produced during the fermentation, which appears to act merely by disengaging morphia from the combinations in which it naturally exists, and which tend to counteract the solvent power of the menstruum. Alcohol has been proposed as the solvent by M. Guillermond, but it is liable to the objection that it dissolves also the resin, a portion of which is afterwards precipitated with the morphia and embarrasses the process. Much of the resin, however, may be separated by distilling most of the alcohol from the tincture, and then adding water. The resin is precipitated, and the liquor may now be treated in the same manner as the aqueous infusion. On the whole, the officinal mode of extraction will probably be found most satisfactory; and should the opium not be exhausted, maceration in successive portions of water may be resorted to and the mixed liquors reduced by evaporation to the quantity ordered in the Pharmacopœia. The solution of opium having been prepared, the next object is to decompose the meconate or other salt of morphia, according as water alone, or a diluted acid has been employed as the menstruum. For this purpose water of ammonia is added, which seizes the acid and precipitates the vegetable alkali; but much colouring matter will be thrown down along with the latter, occasioning some trouble to separate it, unless measures are taken to obviate this effect. The object is gained by mixing the infusion with alcohol, previously to the addition of the ammonia, and by employing the water of ammonia itself in connexion with alcohol, as directed in the Pharmacopœia. This is the peculiarity and chief merit of the process of Dr. Staples. By the presence of the alcohol in all parts of the liquor, the colouring matter is dissolved as soon as it is separated by the ammonia, and the morphia is thus precipitated in a much purer state. The advantage of adding the ammonia in separate portions is, that the morphia being thus more slowly disengaged, can be more completely deprived of its impurities by the alcohol of the mixure, than if the whole were liberated at once. It is necessary to be careful that the ammonia be not in great excess, as it has the property, under these circumstances, of dissolving the morphia in some degree, and will therefore lessen the product, while waste is incurred by its own unnecessary consumption. The quantity of water of ammonia ordered by the Pharmacopœia is too great, if it be used of the proper officinal strength (sp. gr. 0.944). Very little more should be added than is sufficient to saturate the acid present. Four fluidounces will be found abundantly sufficient for this purpose. But the water of ammonia of the shops is often much below the officinal standard, and this should always be attended to in the process. Alcohol is mixed with the ammonia before it is added, in order that every particle of the separated morphia may come in contact with the particles of this fluid, and thus have the opportunity of being deprived of colouring matter. The crystals of morphia obtained by this first operation have a light yellowish colour, and are much purer than when no alcohol is added to the infusion before the precipitation by ammonia. According to Dr. Staples, opium yields from 10 to 12½ per cent. of these crystals. Their purification by solution in boiling alcohol, is the concluding step of the operation. The liquid, on cooling, deposites the morphia in a crystalline state and nearly free from colour. As cold alcohol retains a portion of the morphia in solution, it should not be employed in too large a quantity. Alcohol somewhat reduced by water, is preferable to the highly rectified spirit; as it is less capable of holding the morphia in solution when cold. It is sufficiently strong for the purpose at 25° Baumé (sp. gr. 0.9032). The impure morphia remaining in the alcohol may be obtained by distilling off the latter, and when sufficiently accumulated, may be purified by a separate operation. The crystals of morphia may also be purified by solution in dilute sulphuric acid, digestion with animal charcoal deprived of earthy matter, filtration, and precipitation by ammonia. If alcohol be added to the solution previously to the ammonia, the digestion with animal charcoal may be dispensed with, as the alcohol retains the colouring matter.

2. The process in which magnesia is employed instead of ammonia to precipitate the morphia is that of Robiquet. It is as follows. Select the dryest opium, divide it into small pieces, and macerate it with cold water for six days; then separate the infusion, and knead the residuary mass with a fresh portion of water, in order that all the soluble parts may be extracted. Unite the liquors; add magnesia in the proportion of 5 parts to 100 of the opium used, and boil for fifteen minutes. The magnesia decomposes the meconate of morphia, uniting with the acid, and separating the morphia, which is precipitated with the excess of the earth, an insoluble submeconate of magnesia, and colouring matter. Collect the precipitate upon a filter, and having washed it with water, allow it to drain and dry; then remove it from the filter, reduce it to powder, and digest it with a gentle heat in alcohol of 22° Baumé (sp. gr. 0.9212). Decant the solution, and repeat the digestion in fresh portions of alcohol till this liquid ceases to extract any thing from the precipitate. Most of the colouring matter is thus removed. Place the residue upon a filter and allow it to drain; then remove it, treat it with strong boiling alcohol, and filter the alcoholic solution while boiling hot. Upon cooling, the solution deposites the morphia. Treat the impure residuary mass several times in the same manner with fresh portions of alcohol. After the deposition of the morphia, the mother liquors may be made to furnish a fresh supply by evaporation at a low temperature. If the morphia, thus procured, be not colourless, it may be rendered so by boiling in alcohol with a small portion of pure animal charcoal, filtering the liquid while hot, and allowing it to crystallize.

The process of Robiquet occupies a longer time, requires the consumption of a larger proportion of alcohol, and is attended with a greater loss of morphia, in consequence of the frequent washings, than the processes in which ammonia is employed as the precipitant. Some one of the latter, therefore, is generally preferred.

3. A process for extracting morphia without the employment of alcohol was devised by MM. Henry Jun. and Plisson, but is too tedious for practical use. The process of Drs. Gregory and Robertson of Edinburgh, by which the muriate of morphia is first procured, is more convenient, and has been adopted, to a considerable extent, in Europe. The following account of it is from the last edition of Turner's Chemistry. "The aqueous solution of opium is concentrated in a vessel of tinned iron, or other evaporator, to the consistence of a thin syrup, when a slight excess of chloride of calcium, neutral and quite free from iron, is added; the mixture is boiled for a few minutes, and then poured into an evaporating basin. When cold, the

hydrochlorates [muriates] are taken up in water, which is added until a copious separation of resinous flocks ensues, leaving the insoluble meconate and sulphate of lime with a good deal of colouring matter. The clear liquid is again evaporated to a syrupy consistence, a little marble being added to ensure perfect neutrality, the warm fluid is poured off the sediment into a clean capsule, and is well stirred during crystallization. The mass is then put into a stout cloth, and the liquid part, containing chloride of calcium [muriate of lime], the hydrochlorate [muriate] of narcotina, and colouring matter, is pressed out from the crystallized hydrochlorate [muriate] of morphia: this impure salt is redissolved in water at 70°, filtered through cloth, mixed with a little fresh chloride of calcium, crystallized, and compressed as before. It is taken up in hot water, digested for about 24 hours with animal charcoal, filtered, evaporated, crystallized, and squeezed in cloth as on former occasions; but in this part of the process a little free hydrochloric [muriatic] acid may be added with advantage, as it holds in solution any remaining colouring matter, and renders the crystallization of the hydrochlorate [muriate] of morphia more perfect. The pure salt is then dried at a temperature of 150°, and amounts on the average to 10 per cent. of the opium used, corresponding to 9.43 per cent. of crystallized morphia." The muriate of morphia thus obtained is much used in Scotland as a substitute for opium. It has, however, been proved by Robiquet to contain a portion of muriate of codeia, though, perhaps, not in sufficient quantity to interfere materially with its operation. This impurity may be separated by precipitating morphia from a solution of the muriate by means of ammonia, the codeia being left in solution. Morphia procured by this process is more free from narcotina, than that which results from either of the others described.

Various other processes, or modifications of those above described, have been proposed; but none which, in our opinion, combines the advantages of economy of time and richness of product equally with that of Dr. Staples.

Morphia, obtained in the ordinary manner, contains a considerable proportion of narcotina. It is highly probable that this ingredient exercises no influence, either beneficial or injurious, upon the operation of the morphia; but as the contrary has been supposed, various methods have been employed for separating it. The simplest and easiest is to submit the mixture to the action of sulphuric ether, which dissolves the narcotina and leaves the morphia. The agency of dilute acids, particularly the muriatic, may also be resorted to. As morphia is more soluble in this acid than narcotina, it will be exclusively dissolved, provided the acid be very much diluted, and added in quantities barely sufficient to saturate this base. The morphia may then be obtained by the addition of water of ammonia to the solution. Another mode is to dissolve the mixed bases in strong acetic acid, (of 7° Baumé or sp. gr. 1.0511, for example,) and expose the solution to heat. The narcotina is precipitated, and the morphia remaining in solution may be precipitated by diluting the liquid and adding ammonia. (See *Journ. de Pharm.* xvii. p. 640.) Wittstock advises one of the following methods. Dissolve the impure morphia in dilute muriatic acid, evaporate to the point of crystallization, and strongly express the crystals, which consist solely of the muriate of morphia, the narcotina being retained in the mother waters:—or, saturate the muriatic solution with common salt, which will render the liquor milky, and cause the narcotina to separate after some days; then precipitate the morphia by ammonia:—or, pour into the diluted muriatic solution a weak ley of caustic potassa, which, if in slight excess, will dissolve the morphia at the moment of its separation, while the narcotina is precipitated; then immediately filter the liquor, and separate the morphia by neutralizing the alkali. If the potassa be in considerable excess, a small portion of the narcotina is redissolved. (*Berzelius, Traité de Chimie.*)

The quantity of pure morphia which Turkey opium is capable of affording, varies from nine per cent. or less, to fourteen per cent., according to the quality of the drug; but much less is often obtained, in consequence of the incomplete exhaustion of the opium, or the loss in the process for preparing it.

Medical Properties. There can be no doubt that morphia is the chief, if not the exclusive narcotic principle of opium, from which, however, it differs somewhat in its mode of action. Whether the difference arises from the peculiar state of combination in which morphia exists in opium, or from other narcotic principles being associated with it, has not been determined; but the former would seem to be the probable cause, from the circumstance, that long before the discovery of this alkali, preparations of opium were habitually used, in which the properties of the medicine were somewhat similarly modified by the agency of vinegar, lemon-juice or, other vegetable acid. In consequence of its insolubility in water, morphia in its pure state is less certain in its effects than some of its saline compounds; as the mode and degree of its action must, in some measure, depend on the presence or absence of acid in the stomach, and perhaps on the peculiar character of the acid. Its salts are therefore always preferred. The acetate, sulphate, and muriate, have been employed. Between these there is a great similarity of action, and what may be said of one, in regard to its therapeutical effects, will equally apply to the others. They have the anodyne, soporific, and diaphoretic properties of opium; but are less stimulant, less disposed to constipate the bowels, and less apt to leave behind them headach, nausea, or other unpleasant effect. They are usually also more acceptable to the irritated stomach, and will often be retained, when opium or its tincture would be rejected. They are applicable to all cases where the object is to relieve pain, quiet restlessness, promote sleep, or allay nervous irritation in any shape; but are less efficient than opium in the suppression of morbid discharges, and as stimulants in low forms of disease. We have found them especially useful in the mania arising from intemperance. A great advantage which they possess, is the convenience of their external application to blistered surfaces, and the certainty of their effects when thus applied. In cases which do not admit of the internal use of opium or its preparations, the acetate or sulphate of morphia, sprinkled, in triple the ordinary dose, upon a blistered surface denuded of the cuticle, will be found to exercise upon the system all the influence it is capable of exerting when taken into the stomach. Applied in this manner, these salts are peculiarly useful in relieving violent neuralgic pains, and controlling obstinate sickness of the stomach. When intended to act on the system through the medium of the skin, they should be applied preferably to the epigastrium; when to act locally, as near the affected part as possible. When given in doses nearly, but not quite sufficient to produce sleep, they sometimes give rise to a very troublesome condition of the brain, amounting almost to delirium; but this always subsides spontaneously, or vanishes immediately upon the increase of the dose.

In over-doses, morphia and its salts produce the symptoms of narcotic poisons, though not perhaps in the same degree with a quantity of opium, equivalent in anodyne effect. The toxicological treatment is precisely the same as in the case of laudanum. (See *Opium.*)

As the proportion of acid necessary to neutralize morphia is very small, the dose of the alkali is the same as that of its salts. One-sixth of a grain may be considered equivalent to a grain of opium of the medium strength.

The acetate and sulphate of morphia are officinal; and processes are given for their preparation, under distinct heads. The *muriate* may be prepared by saturating dilute muriatic acid with morphia, evaporating, crystallizing, and pressing the crystals in bibulous paper to separate the narcotina which remains in the mother liquor. It may also be prepared directly from opium by the process of Drs. Gregory and Robertson already described. (See page 909.)

Off. Prep. Morphiæ Acetas, *U.S.;* Morphiæ Sulphas, *U.S.* W.

MORPHIÆ ACETAS. *U.S.* *Acetate of Morphia.*

"Take of Morphia, in powder, *an ounce;* Distilled Water *half a pint;* Acetic Acid *a sufficient quantity.* Mix the Morphia with the Water; then carefully drop in the Acid, constantly stirring, until the Morphia is saturated and dissolved. Evaporate the solution by means of a water-bath, to the consistence of syrup; lastly, dry the Acetate of Morphia with a gentle heat, and rub it into powder." *U.S.*

Acetic acid is employed in the process in preference to vinegar, because it can leave no impurity in the resulting salt. The solution of the morphia in the water is an indication that it is saturated. A small excess of acid is attended with no inconvenience, as it is subsequently driven off by the heat. Care is requisite not to employ too great a heat in the evaporation, as the acetate is readily decomposed, a portion of the acetic acid escaping, and leaving an equivalent portion of uncombined morphia. With attention to arrest the evaporation at a certain point, the acetate may be obtained in the state of crystals; but the crystallization is attended with some difficulty, and evaporation to dryness is almost universally preferred. Some recommend to dissolve the morphia in boiling alcohol, instead of suspending it in water, previously to the addition of the acetic acid. A less heat is thus required in the evaporation, and impurities in the morphia may often be detected, as they are apt to be insoluble in alcohol. To ascertain, in this case, whether the morphia is saturated, it is necessary to employ litmus paper, the blue colour of which should not be restored, if previously reddened by an acid. If the morphia used in preparing the acetate contain narcotina, it will be best to employ as the solvent distilled vinegar, or diluted acetic acid of the same strength, and to favour its solvent power by the application of heat. Under these circumstances it dissolves only the morphia, leaving the narcotina nearly or quite untouched. (See notice by *William Hodgson Jun.*, in the *Journ. of the Phil. Col. of Pharm.* vol. v. p. 35.)

Acetate of morphia crystallizes in the form of slender needles united in fasciculi. It is readily dissolved by water, and less easily by alcohol. As ordinarily obtained, however, by evaporation to dryness, it is not entirely soluble in water, a portion of it being uncombined morphia. To render it soluble, all that is necessary is to add a little distilled vinegar.

From an eighth to a quarter of a grain may be given for a dose, and repeated, if necessary, in order to obtain the anodyne and soporific effect of the medicine. One-sixth of a grain is about equivaleut to a grain of opium. It may be given in pill or solution. It is frequently employed externally, sprinkled on blistered surfaces, to obtain its effects upon the system. W.

MORPHIÆ SULPHAS. *U.S.* *Sulphate of Morphia.*

"Take of Morphia, in powder, *an ounce;* Distilled Water *half a pint;* Diluted Sulphuric Acid *a sufficient quantity.* Mix the Morphia with the Water; then carefully drop in the acid, constantly stirring, till the Morphia is saturated and dissolved. Evaporate the solution, by means of a water-bath, so that crystals may form when it cools. Dry the crystals upon bibulous paper." *U.S.*

In this process, the morphia is known to be saturated when it is wholly dissolved by the water. To ascertain whether the acid is added in excess, litmus paper may be resorted to. If the morphia employed contain narcotina, this will remain in the mother liquor, and will not contaminate the product. The mother liquor remaining after the first crystallization may be evaporated, so as to obtain a fresh supply of the sulphate; but if the morphia was not originally quite pure, the second product will contain the impurities, and should not be used till it has undergone further preparation. When impure morphia is employed, the mother liquor should be mixed with alcohol, or boiled with washed animal charcoal and filtered, and then decomposed by ammonia, which will precipitate the morphia. This may then be converted into sulphate in the manner directed by the Pharmacopœia.

Another mode of obtaining sulphate of morphia, is to dissolve the alkali in boiling alcohol of 36° Baumé (sp. gr. 0.8428), saturate it while hot with sulphuric acid, add animal charcoal previously washed with muriatic acid, boil for a few minutes, and filter the solution while at a boiling temperature. Upon cooling, it deposites most of the sulphate; and the remainder may be obtained by evaporating the mother liquor.

The sulphate of morphia crystallizes in beautifully white, minute, feathery crystals, which are soluble in twice their weight of boiling water. They contain, according to Liebig, in 100 parts, 14.29 of water, 10.33 of sulphuric acid, and 75.38 of morphia. By exposure to a heat of 248° F. they lose 9.66 parts of the water, but cannot be deprived of the remainder without decomposition.

The dose of the sulphate of morphia is from an eighth to a quarter of a grain, which may be given in pill or solution.

Off. Prep. Liquor Morphiæ Sulphatis. W.

LIQUOR MORPHIÆ SULPHATIS. *U.S. Solution of Sulphate of Morphia.*

"Take of Sulphate of Morphia *eight grains;* Distilled Water *half a pint.* Dissolve the Sulphate of Morphia in the Distilled Water." *U. S.*

The sulphate of morphia as found in the shops, particularly that imported from France, is not always entirely soluble in water. This sometimes, perhaps, arises from adulterations; but more frequently, in all probability, from the mode in which the sulphate is prepared. In the process of the French Codex for the preparation of this salt, the quantity of water directed for the suspension of the morphia is insufficient to hold the sulphate when it is formed in solution; and the consequence is, that upon the addition of sulphuric acid, the crystallization of the sulphate takes place before the whole of the morphia has been saturated by the acid. With the resulting salt, therefore, a portion of uncombined morphia is necessarily mixed; and this is probably the cause of the incomplete solubility of the sulphate of morphia alluded to. This explanation is rendered still more probable by the fact, that the addition of a little sulphuric acid usually remedies the defect and renders the whole soluble. Pure sulphate of morphia is readily and entirely soluble in cold water.

This solution is very convenient, by enabling the physician to prescribe a minute dose, which, in consequence of the great energy of the preparations of morphia, is very often necessary. It has the advantage that it may be kept for a very considerable length of time unchanged. The full dose for an adult is from one to two fluidrachms, containing from an eighth to a quarter of a grain of the sulphate. W.

MUCILAGINES.

Mucilages.

Mucilage, in the ordinary acceptation of the term, and in the sense in which it is employed in the U.S. Pharmacopœia, is an aqueous solution of gum or of substances closely allied to it. As used by the British Colleges it appears to signify any bland, viscid, aqueous, vegetable solution, resembling that of gum in sensible properties. W.

MUCILAGO ACACIÆ *U.S., Lond.* MUCILAGO ACACIÆ ARABICÆ. *Ed.* MUCILAGO GUMMI ARABICI. *Dub.* *Mucilage of Gum Arabic.*

"Take of Gum Arabic, in powder, *four ounces;* Boiling Water *half a pint.* Add the Water gradually to the Gum, rubbing them together, till the mucilage is produced." *U. S., Lond.*

The *Edinburgh College* directs one part of gum Arabic, in powder, to two parts of boiling water; the *Dublin College,* four ounces of the former, in coarse powder, to four fluidounces of the latter; both Colleges order the ingredients to be digested, with frequent agitation, till the gum is dissolved, and the resulting mucilage to be strained through linen.

Straining through linen is necessary to separate the foreign substances which are often mixed with gum Arabic. This mucilage is semitransparent, almost colourless if prepared from good gum, viscid, tenacious, of a feeble, peculiar odour, and nearly tasteless. If the solution of gum should be coloured, it may be rendered colourless by the addition of a concentrated solution of chlorine; and, by boiling for about half an hour so as to drive off the chlorine and muriatic acid, it may be rendered fit for use. (*Guérin.*) By keeping, mucilage becomes sour in consequence of the spontaneous generation of acetic acid; and this happens even though it be enclosed in well stopped bottles. But, according to M. Guérin, the aqueous solution of pure gum undergoes no change in vacuo. Mucilage is employed chiefly in the formation of pills, and for the suspension or diffusion of insoluble substances in water.

Off. Prep. Mistura Cretæ, *Dub.;* Mistura Guaiaci, *Lond.;* Potio Carbonatis Calcis, *Ed.* W.

MUCILAGO AMYLI. *Lond., Ed., Dub.* *Mucilage of Starch.*

"Take of Starch *three drachms* [six drachms, *Dub.*]; Water *a pint* [a pound, *Ed.*]. Rub the Starch with the Water gradually added; then boil till a mucilage is produced." *Lond., Ed., Dub.*

This Mucilage has an opaline appearance, and gelatinous consistence, and is much used as a vehicle for laudanum and other active remedies given in the form of enema. In consequence of its demulcent properties, it may be usefully employed as an enema in irritation and inflammation of the mucous coat of the rectum and large intestines. Its unpleasant flavour, when it is prepared from ordinary starch, precludes its employment by the mouth. W.

MUCILAGO GUMMI TRAGACANTHÆ. *Dub.* MUCILAGO ASTRAGALI TRAGACANTHÆ. *Ed.* *Mucilage of Tragacanth.*

"Take of Tragacanth, in powder, *two drachms;* Water *eight fluidounces.* Macerate in a covered vessel till the gum is dissolved; then strain the mucilage through linen." *Dub.*

"Take of Tragacanth, in powder, *two drachms;* Boiling Water *eight* *ounces*. Macerate for twenty-four hours, then triturate the Gum carefully that it may be dissolved, and strain the mucilage through linen." *Ed.*

A part only of tragacanth is soluble in water. The remainder swells up and forms a soft tenacious mass, which may be mechanically mixed with water, but does not form a proper solution. Hence the trituration directed by the Edinburgh College is necessary to complete the incorporation of the ingredients. The mucilage is thick and very viscid, but not permanent, as the water separates from the insoluble portion of the tragacanth on standing. It is chiefly used in making pills and troches. In consequence of its great tenacity, it may be advantageously employed for the suspension of heavy insoluble substances, such as the metallic oxides, in water. W.

OLEA DESTILLATA.

Distilled Oils.

For an account of the general properties of the volatile, essential, or distilled oils, the reader is referred to the head of *Olea Volatilia* in the first part of this work. The following are the different officinal directions for preparing them.

OLEA DESTILLATA. *U. S.*

"Put the substance from which the Oil is to be extracted into a retort or other vessel suitable for distillation, and add enough Water to cover it; then distil into a large refrigeratory. Separate the Distilled Oil from the Water which comes over with it.

"In this manner prepare OIL OF ANISE, from Anise; OIL OF CARAWAY, from Caraway; OIL OF WORMSEED, from Wormseed; OIL OF FENNEL, from Fennel-seed; OIL OF PARTRIDGE-BERRY, from Partridge-berry [leaves]; OIL OF PENNYROYAL [Oleum Hedeomæ], from Pennyroyal; OIL OF JUNIPER, from Juniper [berries]; OIL OF LAVENDER, from Lavender [flowers]; OIL OF PEPPERMINT, from Peppermint; OIL OF SPEARMINT, from Spearmint; OIL OF HORSEMINT, from Horsemint; OIL OF ORIGANUM, from Origanum [Marjoram]; OIL OF PIMENTO, from Pimento; OIL OF ROSEMARY, from Rosemary [tops]; OIL OF SASSAFRAS, from Bark of Sassafras Root." *U. S.*

OLEA DESTILLATA. *Lond.*

"OIL of ANISE, of CHAMOMILE, of CARAWAY, of JUNIPER, of LAVENDER, of PEPPERMINT, of SPEARMINT, of ORIGANUM, of PIMENTO, of PENNYROYAL [Pulegium], of ROSEMARY.

"The seeds of Anise and Caraway, the flowers of Chamomile and Lavender, the berries of Juniper and Pimento, the tops of Rosemary, and the fresh herb of the other plants are to be employed. Put any of these into an alembic, and add sufficient Water to cover it; then distil the Oil into a large refrigeratory. Let the Water which distils over with the Oils of Caraway, Peppermint, Spearmint, Pimento, and Pennyroyal be kept for use." *Lond.*

OLEA VOLATILIA. *Ed.*

"Only so much Water is to be added to the substance as will be sufficient to prevent it from being burnt when distilled. The distillation is to be commenced after due maceration, and the Oil is, lastly, to be separated from the water.

"In this manner are prepared the VOLATILE OIL of CHAMOMILE, from the flowers; of JUNIPER, from the bruised berries; of SAVINE, from the leaves; of LAVENDER, from the flowers; of SASSAFRAS, from the bruised root; of PEPPERMINT, from the herb; of PIMENTO, from the bruised fruit; of ORIGANUM, from the herb; of ANISE, from the seeds; of ROSEMARY, from the tops." *Ed.*

OLEA ESSENTIALIA. *Dub.*

"OIL of ANISEED, of CARAWAY, of FENNEL, from the seeds dried with a medium heat; of SASSAFRAS, from the bark and wood; of JUNIPER, of PIMENTO, from the berries; of LAVENDER, from the flowers; of PEPPERMINT, of SPEARMINT, of ORIGANUM, of PENNYROYAL, of ROSEMARY, of RUE, from the leaves and flowers of the plant while in flower; of SAVINE, from the leaves.

"Put the substance, previously macerated in Water, into an alembic; then by means of the vapour of boiling water, distil into a receiver. Separate by a proper apparatus, the Oil which floats on the surface, or sinks to the bottom, according as it is lighter or heavier than water. In distilling the seeds of Caraway and Fennel, the leaves of Peppermint, Spearmint, and Pennyroyal, and the berries of Pimento, the liquor which comes over with the oil is to be kept for use in the manner directed under the head of Distilled Waters." *Dub.*

The substances from which the volatile oils are extracted, may be employed either in the recent or dried state. Certain flowers, however, such as orange flowers and roses, must be used fresh, or preserved with salt, as they afford little or no oil after exsiccation. Most of the aromatic herbs also, as peppermint, spearmint, pennyroyal, and marjoram, are usually distilled while fresh, and are directed in this state by the London College; although it is thought by some, that when moderately dried, they yield a larger and more grateful product. Dried substances, before being submitted to distillation, require to be macerated in water till they are thoroughly penetrated by this fluid; and to facilitate the action of the water, it is necessary, that when of a hard or tough consistence, they should be properly comminuted by slicing, shaving, rasping, bruising, or other similar mechanical operation.

The water which is put with the subject of distillation into the alembic, answers the double purpose of preventing the decomposition of the vegetable matter by regulating the temperature, and of facilitating the volatilization of the oil, which, though in most instances it readily rises with the vapour of boiling water, requires when distilled alone, a considerably higher temperature, and is at the same time liable to be partially decomposed. Some oils, however, will not ascend readily with steam at 212°; and in the distillation of these it is customary to use water saturated with common salt, which does not boil under 230°. Others again may be volatilized with water at a temperature below the boiling point; and as heat exercises an injurious influence over the oils, it is desirable that the distillation should be effected at as low a temperature as possible. To prevent injury from heat it has been recommended to suspend the substance containing the oil in a basket, or to place it upon a perforated shelf, in the upper part of the alembic, so that it may be penetrated by the steam, without being in direct contact with the water. Another mode of effecting the same object, is to distil *in vacuo.* Dr. Duncan states, that the most elegant volatile oils he had ever seen were prepared in this manner by Mr. Barry, the inventor of the process.

The quantity of water added is not a matter of indifference. An excess above what is necessary, acts injuriously by holding the oil in solution, when the mixed vapours are condensed; and, if the proportion be very large, it is possible that no oil whatever may be obtained separate. On the contrary, if the quantity be too small, the whole of the oil will not be distilled; and there will be danger of the substance in the alembic adhering to the sides of the vessel, and thus becoming burnt. Enough water should always be added to cover the solid material, and prevent this latter accident. Dried plants require more water than those which are fresh and succulent. The whole amount of materials in the alembic should not exceed three-fourths of its capacity; as otherwise there would be danger of the liquor boiling over. The form of the alembic has a considerable influence over the quantity of water distilled, which depends more upon the extent of surface than the amount of liquid submitted to evaporation. By employing a high and narrow vessel, we may obviate the disadvantage of an excess of water. The broad shallow alembic, suitable for the distillation of alcohol and the spirituous liquors, will not answer so well in this case. Sometimes the proportion of oil contained in the substance employed is so small, that it is wholly dissolved in the water distilled, even though the proportion of the liquid in the alembic is not greater than is absolutely essential. In this case it is necessary to redistil the same water several times from fresh portions of the plant till the quantity of oil exceeds its solvent power. This process is called *cohobation.*

The more volatile oils pass with facility along with the steam into the neck of the common still; but some which are less volatile are apt to condense in the head, and thus return into the alembic. For the distillation of the latter, a still should be employed with a large and very low head, having a rim or gutter around its internal circumference, into which the oils may be received as they condense, and thence pass into the neck. As, after the distillation of any one oil, it is necessary that the apparatus should be thoroughly cleansed before being used for the preparation of another, it is better that the condensing tube should be straight, than spiral as in the ordinary still. It should be recollected, moreover, that certain oils, such as those of anise and fennel, become solid at a comparatively high temperature; and that in the distillation of these, the water employed for refrigeration should not be below 42° F.

The mixed vapours are condensed into a milky liquid, which is collected in a receiver, and after standing for some time separates into a clear solution of the oil in water, and into the oil itself, the latter floating on the surface, or sinking to the bottom, according as it is lighter or heavier than water. The distillation should be continued so long as the fluid which comes over has this milky appearance.

The last step in the process is to separate the oil from the water. For this purpose the *Florence receiver* may be used. This is a conical glass vessel, broad at the bottom, and narrow towards the top, and, very near its base, furnished with a tubulure or opening, to which is adapted, by means of a pierced cork, a bent tube so shaped as to rise perpendicularly to seven-eighths of the height of the receiver, then to pass off from it at right angles, and near the end to bend downwards. The condensed liquid being admitted through the opening in the top of the receiver, the oil separates, and rising to the top, occupies the upper narrow part of the vessel, while the water remains at the bottom and enters the tube affixed to the receiver. When the surface of the liquid attains in the receiver a higher level than the top of the tube, the water will necessarily begin to flow out through the latter, and may be received in bottles. The oil thus accumulates so long as the process continues; but it is evident that the plan is applicable only to the oils lighter than water. For the heavier oils, cylindrical vessels may be employed, to be renewed as fast as they are filled. But as all the water cannot be removed by these plans, it is necessary to resort to some other method of effecting a complete separation. An instrument called a *separatory* is usually employed for this purpose. It consists of a glass funnel, bulging at the top, where it is furnished with a stopper, and prolonged at the bottom into a very narrow tube. (See figure, page 693.) The lower opening being closed, the mixed liquids are introduced, and allowed to stand till they separate. The orifice at the bottom is then opened, and the stopper at top being a little loosened so as to admit the air, the heavier liquid slowly flows out; and may be separated to the last drop from the lighter, which floats above it. If the oil is heavier than water, it passes out of the separatory, if lighter, it remains within. Another mode of separating the oil, is to introduce into the vessel containing the two liquids, one end of a cord of cotton, the other end hanging out and terminating in a suitable receptacle beneath the level of that immersed in the liquid. The oil at top passes through the cord, and may thus be wholly removed. The last drops may be collected by pressing the cord between the fingers.

The water saturated with oil should be preserved for future distillations, as it can now dissolve no more of the oil, and will therefore yield a larger product.

When first procured, the oil has a disagreeable empyreumatic odour, from which it may be freed by allowing it to stand for some days in vessels loosely covered with paper. It should then be introduced into small opaque bottles, which should be well stopped, so as to exclude the air.

The volatile oils have the medical properties of the plants from which they are derived; and as their remedial application has been mentioned under the heads of these plants respectively, it will be unnecessary to treat of it in this place. They may be administered dropped on a lump of sugar; or triturated with at least ten times their weight of sugar, forming an *oleo-saccharum*, and then dissolved in water; or made into an emulsion with water, sugar, and gum Arabic. They are frequently kept dissolved in alcohol under the name of *essences*. W.

OLEUM ANISI. *U.S.*, *Lond.*, *Dub.* OLEUM VOLATILE PIMPINELLÆ ANISI. *Ed.* *Oil of Anise.*

Recluz obtained from fresh anise seeds from 2.125 to 2.48 per cent. of oil; from the dried, 3.125 per cent. The oil employed in this country is almost all imported. It is colourless or yellowish, with the peculiar odour and taste of the seed. At 50° it crystallizes in flat tables, and does not melt under 62°. Its. sp. gr. is variously stated from 0.9768 to 0.9903. Berzelius gives it 0.9857 at 77° F. It is soluble in all proportions in alcohol of 0.806; but alcohol of 0.840 dissolves at 77° only 42 per cent. It consists of two oils, one solid at ordinary temperatures and heavier than water (*stearoptene*), the other liquid and more volatile (*eleoptene*). It is said to be sometimes adulterated with spermaceti, wax, or camphor. The first two may be detected by their insolubility in cold alcohol, the last by its odour. The dose of the oil is from five to fifteen drops. Its comparative mildness adapts it to infantile cases. The *oil of star aniseed* (*oleum badiani*), which resembles it in flavour, is frequently substituted for it in this country.

Off. Prep. Syrupus Sarsaparillæ, *U.S.*; Tinctura Opii Camphorata, *U.S.*, *Dub.* W.

OLEUM ANTHEMIDIS. *Lond.* OLEUM VOLATILE ANTHEMIDIS NOBILIS. *Ed.* *Oil of Chamomile.*

This is never prepared, and little used, in this country. Baumé obtained thirteen drachms of the oil from eighty two pounds of the flowers. It has the peculiar smell of chamomile, with a pungent somewhat aromatic taste.

When recently distilled it is of a sky-blue colour, which changes to yellow on exposure. The sp. gr. of the English oil is said in be 0.9083. It has sometimes been used in spasm of the stomach, and as an adjunct to purgative medicines. The dose is from five to fifteen drops.

On the continent of Europe, an oil extracted from the *Matricaria Chamomilla* is employed under the name of oil of chamomile. It is dark blue, thick, and nearly opaque, becoming brown and unctuous by time. It has the odour of the plant from which it is derived, and an aromatic taste. W.

OLEUM CARI. *U.S.* Oleum Carui. *Lond., Dub.* *Oil of Caraway.*

This oil is prepared to a considerable extent by our distillers. The fresh seeds yield on an average about 4.7 per cent. (Recluz); but the product is very variable. The oil of caraway is somewhat viscid, of a pale yellow colour, with the odour and taste of the seeds. Its sp. gr. is 0.946 according to Baumé, 0.931 according to Brande. It is much used to impart flavour to medicines, and to correct their nauseating and griping effects. The dose is from one to ten drops.

Off. Prep. Confectio Scammoneæ, *Lond., Dub.;* Electuarium Sennæ, *Dub.;* Pilulæ Aloës Compositæ, *Lond., Dub.* W.

OLEUM CHENOPODII. *U.S.* *Oil of Wormseed.*

This oil is peculiar to the United States. It is of a light yellow colour when recently distilled, but becomes deeper yellow, and even brownish by age. It has in a high degree the peculiar flavour of the plant. Its sp. gr. is 0.908. It is used as an anthelmintic, in the dose of from four to eight drops for a child, repeated morning and evening for three or four days, and then followed by a brisk cathartic. W.

OLEUM FŒNICULI. *U.S.* Oleum Fœniculi Dulcis. *Dub.* *Oil of Fennel.*

Fennel seeds yield about 2.5 per cent. of oil. That used in this country is imported. It is colourless or yellowish, with the odour and taste of the seeds. Its sp. gr. is 0.997. It congeals below 50° into a crystalline mass, separable by pressure into a solid and liquid oil (*stearoptene* and *eleoptene*), the former heavier than water, and less volatile than the latter, which rises first when the oil is distilled. As found in the shops, therefore, the oil of fennel is not uniform; and Dr. Montgomery found that a specimen which he examined did not congeal at 22°. The dose is from five to fifteen drops. W.

OLEUM GAULTHERIÆ. *U.S.* *Oil of Partridge-Berry.*

This oil is known only in the United States. It is directed by the Pharmacopœia to be prepared from the leaves of the *Gaultheria procumbens;* but the whole plant is usually employed. It is supposed to exist also in the bark of the *Betula lenta*, the root of the *Polygala paucifolia*, and the roots and stems of the *Spiræa ulmaria*, *Spiræa lobata*, and *Gaultheria hispidula*, which have its peculiar flavour. The oil of partridge-berry has a brownish-yellow colour, a sweetish, slightly pungent, peculiar taste, and a very agreeable characteristic odour, by which it may be readily distinguished from all other oils. It is the heaviest of the known essential oils, having the sp. gr. 1.17. (*Journ. of the Phil. Col. of Pharm.* iii. 199.) This affords an easy method of ascertaining its purity. It is used chiefly on account of its pleasant flavour, to cover the taste of other medicines.

Off. Prep. Syrupus Sarsaparillæ, *U.S.* W.

OLEUM HEDEOMÆ. *U.S. Oil of Pennyroyal.*

This, though analogous in properties to the European oil of pennyroyal, is derived from a distinct plant—the *Hedeoma pulegioides*—peculiar to North America. It has a light yellow colour, with the odour and taste of the herb. Its sp. gr. is 0.948. It may be used as a remedy in flatulent colic and sick stomach, to correct the operation of nauseating or griping medicines, and to impart flavour to mixtures. The dose is from two to ten drops. W.

OLEUM JUNIPERI. *U.S., Lond., Dub.* OLEUM VOLATILE JUNIPERI COMMUNIS. *Ed.* *Oil of Juniper.*

The proportion of oil which juniper berries afford is stated differently by different authors, from 0.78 to 5 per cent. The greatest quantity obtained by Recluz was 2.34 parts from 100. The berries are most productive when bruised. The oil of juniper consumed in this country is brought from Europe. It is colourless, or of a light greenish-yellow, with a terebinthinate odour, and a hot acrid taste. Its sp. gr. is 0.911. It is not very soluble in alcohol. The oil of turpentine is often fraudulently added, but may be detected by the specific gravity of the mixture, which is considerably less than that of the unadulterated oil of juniper.

This oil is stimulant, carminative, and diuretic; and may be employed advantageously in debilitated dropsical cases, in connexion with other medicines, especially with digitalis. It is this oil which imparts to Holland gin its peculiar flavour and tendency to the kidneys. The dose is from five to fifteen drops two or three times a day, and may be considerably increased. W.

OLEUM LAVANDULÆ. *U.S., Lond., Dub.* OLEUM VOLATILE LAVANDULÆ SPICÆ. *Ed.* *Oil of Lavender.*

Dried lavender flowers yield on an average about 1.5 per cent. of a very fluid, lemon-yellow oil, having the fragrance of the flowers, and an aromatic, burning taste. That met with in commerce has the sp. gr. 0.898 at 68° F., which is reduced to 0.877 by rectification. (*Berzelius.*) According to Brande, the sp. gr. of the oil obtained from the whole herb is 0.9206. Alcohol of 0.830 dissolves the oil of lavender in all proportions; that of 0.887 only 42 per cent. (*Berzelius.*) Proust states, that when allowed to stand in imperfectly stopped bottles, it lets fall a crystalline deposite (*stearoptene*), which he considers identical with camphor, and which often amounts to one-fourth of the weight of the oil. It is said that the portion of oil first distilled is most agreeably fragrant, and is often kept separate, and sold at a higher price. The oil of lavender is used chiefly as a perfume, though possessed of carminative and stimulant properties, and sometimes useful in cases of nervous languor and headach. The dose is from one to five drops.

The *oil of spike* is procured from the broad-leaved variety of the lavender, which grows wild in Europe, the *Lavandula Spica* of De Candolle. Its odour is less fragrant than that of the common oil of lavender, and is somewhat analogous to that of the oil of turpentine, with which it is said to be often adulterated. It is much used by artists in the preparation of varnishes.

Off. Prep. Spiritus Ammoniæ Succinatus, *Lond.* W.

OLEUM MENTHÆ PIPERITÆ. *U.S., Lond.* OLEUM VOLATILE MENTHÆ PIPERITÆ. *Ed.* OLEUM MENTHÆ PIPERITIDIS. *Dub.* *Oil of Peppermint.*

Peppermint varies exceedingly in the quantity of oil which it affords.

Four pounds of the fresh herb yield, according to Baumé, from a drachm and a half to three drachms of the oil. The product is generally less than one per cent. This oil is largely distilled in the United States. It is of a greenish-yellow colour, a strong aromatic odour, and a warm, camphorous, very pungent taste, succeeded, when air is admitted into the mouth, by a sense of coolness. Its sp. gr. is stated differently from 0.907 to 0.920. Upon long standing it deposites a *stearoptene*, considered by Proust as identical with camphor. According to Giese, it is only the oil distilled from the herb gathered when in flower and dried, that yields this crystalline precipitate. Berzelius states, that at—8° F. it deposites small capillary crystals.

The oil of peppermint is stimulant and carminative, and is much used in flatulence, nausea, spasmodic pains of the stomach and bowels, and as a corrigent or adjuvant of other medicines. The dose is from one to three drops, and is most conveniently given rubbed up with sugar and then dissolved in water. The oil is also very frequently employed in the form of *essence of peppermint*, prepared by dissolving two fluidounces in a pint of alcohol, and given upon sugar in the dose of ten or twenty drops.

Off. Prep. Aqua Menthæ Piperitæ, *U.S.;* Pilulæ Rhei Compositæ, *Ed.;* Pilulæ Sulphatis Ferri Comp., *Ed.;* Spiritus Menthæ Piperitæ, *Lond.*, *Dub.* W.

OLEUM MENTHÆ VIRIDIS. *U.S.*, *Lond.*, *Dub.* OLEUM VOLATILE MENTHÆ VIRIDIS. *Ed.* *Oil of Spearmint.*

According to Lewis, ten pounds of spearmint yield an ounce of oil; by others the product is stated not to exceed one part from five hundred. The oil is largely distilled in this country. It is greenish when recently prepared, but becomes red with age, and ultimately almost of a mahogany colour. Its flavour is analogous to that of the oil of peppermint, but is less agreeable and less pungent. Its sp. gr., according to Lewis, is 0.975, according to Brande 0.9394. It is used for the same purposes as the oil of peppermint, in the dose of from two to five drops. An *essence of spearmint* is prepared by dissolving two fluidounces of the oil in a pint of alcohol, and may be given in the quantity of from twenty to forty drops, upon a lump of sugar.

Off. Prep. Aqua Menthæ Viridis, *U.S.*, *Lond.*, *Dub.;* Infusum Menthæ Compositum, *Dub.;* Spiritus Menthæ Viridis, *Lond.*, *Dub.* W.

OLEUM MONARDÆ. *U.S.* *Oil of Horsemint.*

This is prepared by our distillers from the fresh herb of the *Monarda punctata*. It has a reddish-amber colour, a fragrant odour, and a warm, very pungent taste. Applied to the skin it acts as a powerful rubefacient, quickly producing heat, pain, redness, and even vesication. This property of the oil was made known to the profession by Dr. Atlee of Philadelphia, who employed it externally with advantage in low forms of typhus fever, cholera infantum, chronic rheumatism, and other affections in which rubefacients are indicated. In ordinary cases it should be diluted before being applied. It may be given internally as a stimulant and carminative, in the dose of two or three drops mixed with sugar and water. W.

OLEUM ORIGANI. *U.S.*, *Lond.*, *Dub.* *Oil of Origanum.*

This is obtained from the common marjoram, *Origanum vulgare*, and is frequently called *oil of marjoram*. The plant varies exceedingly in the proportion which it affords. The mean product may be stated at from four to six parts from a thousand. The recent oil, when properly prepared, is of a yellow colour; but if too much heat is used in the distillation, it is said to be reddish, and it acquires the same tint by age. It has the odour of the plant, and a hot acrid taste. Its sp. gr., according to Lewis, is 0.940, according to Brande 0.909. It is sometimes used as an external irritant, and to allay the pain of toothach, by being introduced, on lint or cotton, into the cavity of a carious tooth. It is not employed internally.

Off. Prep. Linimentum Saponis Camphoratum, *U.S.* W.

OLEUM VOLATILE ORIGANI MARJORANÆ. *Ed.* *Oil of Sweet Marjoram.*

It is somewhat doubtful, whether the Edinburgh College did not intend to direct, under this title, the oil of marjoram (*Oleum Origani*); at least the terms are considered as identical in their signification by the authors of the British Dispensatories. The oils of the two plants, however, are entirely distinct. The sweet marjoram yields when distilled from 2.5 to 6 parts of oil out of 1000 of the plant. This oil is of a lemon-yellow colour, light, and camphorous, and deposites upon long standing a substance supposed to be identical with camphor. It is not used in this country. W.

OLEUM PIMENTÆ. *U.S.*, *Lond.*, *Dub.* OLEUM VOLATILE MYRTI PIMENTÆ. *Ed.* *Oil of Pimento.*

The berries yield from 1 to 4 per cent. of oil, which, as found in the shops, has a brownish-red colour, and the odour and taste of pimento, though warmer and more pungent. It is said, when freshly distilled, to be colourless or yellowish. Nitric acid reddens it. Bonastre states that it combines with salifiable bases like the oil of cloves. Its sp. gr. is 1.021. It may be given for the same purposes with the other aromatic stimulant oils. The dose is from three to six drops.

Off. Prep. Emplastrum Aromaticum, *Dub.* W.

OLEUM PULEGII. *Lond.*, *Dub.* *Oil of European Pennyroyal.*

About 1 part of this oil on an average is obtained from 100 parts of the plant. When freshly distilled it is yellowish, but becomes reddish by age. Its sp. gr. is, according to Lewis, 0.978, to Brande 0.939. It possesses medical properties similar to those of the oil of peppermint; but is moldes used in this country. The dose is from one to five drops.

Off. Prep. Aqua Pulegii, *Lond.*, *Dub.*; Spiritus Pulegii, *Lond.*, *Dub.*

OLEUM ROSMARINI. *U.S.*, *Lond.* OLEUM VOLATILE RORISMARINI OFFICINALIS. *Ed.* OLEUM RORISMARINI. *Dub.* *Oil of Rosemary.*

The fresh leaves of rosemary yield, according to Baumé, 26 per cent. of oil; but the product is stated very differently by different authors. This oil is colourless, with an odour similar to that of the plant, though less agreeable. Its sp. gr. is 0.911, but is reduced to 0.8886 by rectification. It is soluble in all proportions in alcohol of 0.830; but requires for solution at 64°, forty parts of alcohol of the sp. gr. 0.887. (*Berzelius.*) Kept in bottles imperfectly stopped, it deposites a *stearoptene*, which is considered identical with camphor, and the proportion of which, according to Proust, amounts sometimes to one-tenth of the oil. Bucholz states that it affords camphor when digested with from one half its weight to an equal weight of potassa, and distilled. It is said to be sometimes adulterated with the oil of turpentine, which may be detected by mixing the suspected liquid with an equal volume of pure alcohol. The oil of rosemary is dissolved, and that of turpentine left. This oil is possessed of stimulant properties, but is employed chiefly as an ingredient of rubefacient liniments. The dose is from three to six drops.

Off. Prep. Alcohol Ammoniatum Aromaticum, *U.S., Ed.;* Linimentum Saponis Camphoratum, *U.S.;* Spiritus Rosmarini, *U.S., Lond., Dub.;* Tinctura Saponis Camphorata, *U.S., Ed.;* Tinctura Saponis et Opii, *Ed.* W.

OLEUM RUTÆ. *Dub.* *Oil of Rue.*

Rue yields a very small proportion of a yellow or greenish oil, which becomes brown with age. It has the strong unpleasant odour of the plant, and an acrid taste. According to Dr. A. T. Thomson it congeals at 40°, but Dr. Montgomery found it to remain liquid at 28° F. It is stimulant and supposed to be antispasmodic; and has been given in hysteria, convulsions, and amenorrhœa. The dose is from two to five drops. W.

OLEUM SABINÆ. *Dub.* OLEUM VOLATILE JUNIPERI SABINÆ. *Ed.* *Oil of Savine.*

Savine is very abundant in volatile oil. The fresh leaves yield, according to Hoffmann and Murray, between 15 and 16 per cent.; the dried are much less productive. The oil is yellow, limpid, light, strongly odorous, and of an exceedingly acrid taste. It is stimulant, emmenagogue, and actively rubefacient; and may be given for the same purposes as the plant in substance. It has been much employed empyrically in amenorrhœa, and with a view to produce abortion, and in some instances with fatal effects. The dose is from two to five drops. W.

OLEUM SASSAFRAS. *U.S., Dub.* OLEUM VOLATILE LAURI SASSAFRAS. *Ed.* *Oil of Sassafras.*

The proportion of oil yielded by the root of sassafras is variously stated from 1.25 to 2 per cent. The bark of the root, directed by the U.S. Pharmacopœia, would afford a larger quantity. This oil is of a yellow colour, becoming reddish by age. It has the fragrant odour of sassafras, with a warm pungent aromatic taste. It is among the heaviest of the volatile oils, having the sp. gr. 1.094. According to Bonastre, it separates, by agitation with water, into two oils, one lighter, the other heavier than water. Berzelius states that the first is often nothing more than oil of turpentine existing as an adulteration in the oil of sassafras. Nitric acid colours it red, and fuming nitric acid inflames it more readily than most other oils. It has the useful property of dissolving caoutchouc. When kept for a long time it deposites transparent crystals, having the same odour as the liquid oil. It is stimulant, carminative, and supposed to be diaphoretic; and may be employed for the same purposes with the bark from which it is derived. The dose is from two to ten drops.

Off. Prep. Syrupus Sarsaparillæ, *U.S.* W.

OLEUM SUCCINI. *U.S., Ed., Dub.* *Oil of Amber.*

"Take of Amber, in powder, *any quantity*. Put the Amber, previously mixed with an equal weight of sand, into a glass retort, which is to be only half filled; then distil, by means of a sand-bath, with a gradually increasing heat, an acid liquor, an oil, and a concrete acid impregnated with oil. Separate the oil from the other matters, and preserve it in well stopped bottles." *U.S.*

The unrectified oil of amber is not among the preparations directed by the *London College.* The *Edinburgh* and *Dublin Colleges* obtain it by the same process by which they procure succinic acid. (See *Acidum Succinicum.*)

The amber in this process undergoes decomposition, and affords, among other products, an empyreumatic oil which floats in the receiver upon the surface of an acid liquor. The heat requisite for the complete decomposition of the amber cannot be supported by a glass retort; and in order that all the oil which it is capable of yielding may be collected, the distillation should be performed in a tubulated iron or earthenware retort, which may be placed immediately upon the fire. The sand is added to prevent the amber from swelling too much. The oil may be separated from the acid liquor by means of the separating funnel. As first procured, it is a thick, very dark coloured liquid, of a peculiar strong empyreumatic odour. In this state it is occasionally employed as a liniment; but for internal use it should always be rectified. W.

OLEUM SUCCINI RECTIFICATUM. *U.S., Dub.* OLEUM SUCCINI. *Lond.* OLEUM SUCCINI PURISSIMUM. *Ed.* *Rectified Oil of Amber.*

"Take of Oil of Amber *a pint;* Water *six pints.* Distil them from a glass retort, till four pints of the Water shall have passed over into the receiver; then separate from the Water the Oil which has been distilled, and preserve it in well stopped bottles." *U.S.*

The *Edinburgh College* employs one part of oil of amber and six of water; the *Dublin*, a pound of the former and six pints of the latter; both distil until two-thirds of the water has passed into the receiver, and then separate the oil.

"Put amber into an alembic, and distil from a sand-bath, with a heat gradually increased, an acid liquor, an oil, and a salt contaminated with oil; then distil the oil a second and a third time." *Lond.*

By successive distillations the oil of amber is rendered thinner and more limpid, till at length it is obtained colourless. The first portions which distil are less coloured than those which follow, and may be separated for keeping, while the remainder is submitted to another distillation. For practical purposes, however, the oil is sufficiently pure when once redistilled, as directed in the processes of the U.S., Edinburgh, and Dublin Pharmacopœias. As usually found in the shops, the rectified oil is of a light yellowish-brown or amber colour. When quite pure it is colourless, as fluid as alcohol, of sp. gr. 0.758 at 75°, and boils at 186°. It has a strong, peculiar, unpleasant odour, and a hot, acrid taste. It imparts these properties in some degree to water without being perceptibly dissolved. It is soluble in eight parts of alcohol of the sp. gr. 0.847 at 55°, in five parts of the sp. gr. 0.825, and in all proportions in absolute alcohol. The fixed oils unite with it. On exposure to the light and air, it slowly changes in colour and consistence, becoming ultimately black and solid.

Medical Properties and Uses. Rectified oil of amber is stimulant and antispasmodic; and occasionally promotes the secretions, particularly that of urine. It has been employed with advantage in amenorrhœa, and in various spasmodic and convulsive affections, as tetanus, epilepsy, hysteria, hooping cough, and infantile convulsions from intestinal irritation, &c. The dose is from five to fifteen drops, diffused in some aromatic water by means of sugar and gum Arabic. Externally applied, the oil is rubefacient, and is considerably employed as a liniment in chronic rheumatism and palsy, and in certain spasmodic disorders, as hooping cough and infantile convulsions. In the latter affection it should be rubbed along the spine, and is highly recommended by Dr. Parrish of Philadelphia, mixed with an equal measure of laudanum and diluted with three or four parts of olive oil and of brandy.

Off. Prep. Spiritus Ammoniæ Succinatus, *Lond.* W.

OLEUM TEREBINTHINÆ RECTIFICATUM. *Lond., Dub.* OLEUM VOLATILE PINI PURISSIMUM. *Ed.* *Rectified Oil of Turpentine.*

"Take of Oil of Turpentine *a pint;* Water *four pints.* Distil the Oil." *Lond.*

"Take of Oil of Turpentine *one part;* Water *four parts.* Distil as long as any Oil comes over." *Ed.*

"Take of Oil of Turpentine *two pints;* Water *four pints.* Distil a pint and a half of the Oil." *Dub.*

The oil of Turpentine becomes impure by exposure, in consequence of the absorption of oxygen and the production of resin. From this it may be freed by distillation, as above directed, or by the agency of alcohol. (See *Oleum Terebinthinæ.*) The process for distilling it is attended with some inconvenience, in consequence of the great inflammability of the vapour, and its rapid formation, which causes the liquid to boil over. In this country, the apothecary can almost always purchase the oil sufficiently pure for medical use without the necessity of rectifying it. The presence of a small proportion of resin does not interfere with its efficiency as a medicine. W.

PILULÆ.

Pills.

These are small globular masses of a size convenient for swallowing. They are well adapted for the administration of medicines which are unpleasant to the taste or smell, or insoluble in water, and do not require to be given in large doses. Deliquescent substances should not be made into pills, and those which are efflorescent should be previously deprived of their water of crystallization. Care should also be taken not to combine materials, the mutual reaction of which may result in a change of form.

Some substances have a consistence which enables them to be made immediately into pills. Such are the softer extracts and certain gum-resins; and the addition of a little water to the former, and a few drops of spirit to the latter, will give them the requisite softness and plasticity, if previously wanting. Substances which are very soft, or in the liquid state, are formed into the pilular mass by incorporation with dry and inert powders, such as crumb of bread, wheat flour, starch, and powdered gum Arabic. Powders must be mixed with soft solid bodies, as extracts, confections, soap, &c., or with tenacious liquids, as syrup, molasses, honey, or mucilage. Heavy metallic powders are most conveniently made into pills with the former; light vegetable powders with the latter. Mucilage is very often used; but pills made with it are apt when kept to become hard and of difficult solubility in the liquors of the stomach, and if metallic substances are mixed with it, the mass does not work well. A mixture of syrup and powdered gum Arabic is not subject to the same inconveniences, and is an excellent material for the formation of pills. Many powders require only the addition of water. Such are all those which contain ingredients capable of forming an adhesive or viscid solution with this liquid. Care should always be observed, that the matter added be not incompatible with the main ingredients of the pill.

The materials should be accurately mixed together, and beat in a mortar till formed into a perfectly uniform and plastic mass. This should be of such a consistence, that the pills may preserve their form, without being so hard as to resist the solvent power of the gastric liquors. As pills often become very hard by time, it is convenient, in some instances, to keep the mass in a state fit to be divided when wanted for use. This may be done by wrapping it in bladders, putting it in covered pots, and occasionally moistening it as it becomes dry.

The mass, having been duly prepared, is made into pills by rolling it with a spatula into a cylinder of precisely the same thickness throughout, and of a length corresponding to the number of pills required. It is then divided as equally as possible by the hand, or more accurately by a machine made for the purpose. The pills receive a spherical form by being rolled between the fingers. In order to prevent their adhesion to one another, or to the sides of the vessel in which they may be placed, it is customary to agitate them with some dry powder, which gives them an external coating, that serves also to conceal their taste. For this purpose, carbonate of magnesia, starch, or powdered liquorice root may be used. Carbonate of magnesia is sometimes incompatible with one of the ingredients of the pills, starch is almost too light, and liquorice root will, as a general rule, be found the best. The powder of *Lycopodium* is much employed on the continent of Europe; and it was formerly the custom to give the pill a coating of gold or silver leaf.

Though the U.S. Pharmacopœia, in every instance, orders the mass to be divided into pills; yet it should be understood rather as indicating the number of pills to be made from a certain quantity of the mass when particular directions are not given by the physician, than as requiring the division to be made immediately after the materials have been mixed. It will generally be found convenient by the apothecary to keep a portion of the mass undivided. W.

PILULÆ ALOES. *U.S.* PILULÆ ALOETICÆ. *Ed.* *Aloetic Pills.*

"Take of Aloes, in powder, Soap, each, *an ounce.* Beat them with water so as to form a mass, to be divided into two hundred and forty pills." *U.S.*

The *Edinburgh College* directs equal quantities of aloes and soap to be beat with simple syrup into a mass fit for forming pills.

The soap, in this formula, not only serves to impart a proper pilular consistence to the aloes, but is thought to qualify its operation, and diminish its liability to irritate the rectum. Five pills, containing ten grains of aloes, may be given with a view to their purgative effect; but the preparation is usually employed as a laxative in cases of habitual costiveness, in the quantity of one, two, or three pills, taken before breakfast, before dinner, or at bedtime. W.

PILULÆ ALOES COMPOSITÆ. *Lond.*, *Dub.* *Compound Pills of Aloes.*

"Take of Socotrine Aloes [Hepatic Aloes, *Dub.*], in powder, *an ounce;* Extract of Gentian *half an ounce;* Oil of Caraway *forty minims;* Simple Syrup *a sufficient quantity.* Beat them together, till they are thoroughly incorporated." *Lond.*

A reaction takes place between the aloes and extract of gentian when rubbed together, which renders the mass so soft as sometimes to require the addition of a light powder. The use of syrup is therefore unnecessary and improper. This combination is well adapted as a laxative to the costiveness of sedentary and dyspeptic persons. The dose is from five to twenty grains, according to the degree of effect desired.* W.

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* The following is the formula for the aloetic pills usually called *dinner pills, or Lady Webster's pills.* They are the *pilulæ stomachicæ* of the fifth edition of the Paris Codex, A.D. 1758. Take of the best Aloes six drachms; Mastich and Red Roses, each, two

PILULÆ ALOES ET ASSAFŒTIDÆ. *U.S., Ed.* *Pills of Aloes and Assafetida.*

"Take of Aloes, in powder, Assafetida, Soap, each. *half an ounce.* Beat them with water so as to form a mass, to be divided into one hundred and eighty pills. *U.S.*

The *Edinburgh College* takes equal parts of Socotrine aloes, assafetida, and soap, and beats them into a mass with mucilage of gum Arabic.

These pills are peculiarly adapted, by the stimulant and carminative properties of the assafetida, to cases of costiveness attended with flatulence and debility of the digestive organs. Each pill contains about four grains of the mass. From two to five may be given for a dose. W.

PILULÆ ALOES ET MYRRHÆ. *U.S., Ed.* PILULÆ ALOES CUM MYRRHA. *Lond., Dub.* *Pills of Aloes and Myrrh.*

"Take of Aloes, in powder, *two ounces;* Myrrh, in powder, *an ounce;* Saffron *half an ounce;* Syrup *a sufficient quantity.* Beat the whole together so as to form a mass, to be divided into four hundred and eighty pills." *U.S.*

The directions of the *Edinburgh* Pharmacopœia correspond with the above, Socotrine aloes being particularly indicated. Those of the *London* and *Dublin* Pharmacopœias differ only in the proportion of saffron, which is doubled, Socotrine aloes being directed by the former, and hepatic aloes by the latter.

This composition has been long in use, and is generally known by the name of *Rufus's pills.* It is employed as a warm stimulant cathartic in debilitated states of the system, attended with constipation and retention or suppression of the menses. From three to six pills, or from ten to twenty grains of the mass may be given for a dose. W.

PILULÆ AMMONIARETI CUPRI. *Ed.* *Pills of Ammoniaret of Copper.*

"Take of Ammoniaret of Copper, in fine powder, *sixteen grains;* Crumb of Bread *four scruples;* Water of Carbonate of Ammonia *a sufficient quantity.* Beat them into a mass, to be divided into thirty-two equal pills. *Ed.*

This is a convenient form for administering ammoniated copper. One pill, containing half a grain of the preparation of copper, may be given night and morning; and the dose gradually increased to five or six pills. W.

PILULÆ ASSAFŒTIDÆ. *Assafetida Pills.*

"Take of Assafetida *an ounce and a half;* Soap *half an ounce.* Beat them with water so as to form a mass, to be divided into two hundred and forty pills." *U. S.*

drachms; Syrup of Wormwood sufficient to form a mass, to be divided into pills of three grains each. Common syrup may be substituted for the syrup of wormwood. One or two of these pills taken shortly before a meal, will usually produce one free evacuation.

The Philadelphia College of Pharmacy has adopted formulæ for the compound aloetic preparations commonly called *Hooper's* and *Anderson's pills*, of which the following are copies.

"*Hooper's female pills.* ℞ Aloes Barbadensis ℥viij., Ferri Sulphatis Exsiccati ℥ij., ʒiss., *vel* Ferri Sulphatis Crystal. ℥iv., Extracti Hellebori Nigri ℥ij., Myrrhæ, ℥ij., Saponis ℥ij., Canellæ in pulv. tritæ ℥j., Zingiberis in pulv. trit. ℥j.—Beat them well together into a mass with water, and divide into pills, each containing two and a half grains." *Journ. of the Phil. Col. of Pharm.* v. 25.

"*Anderson's Scots' Pills.* ℞ Aloes Barbadensis ℥xxiv., Saponis ℥iv., Colocynthidis ℥j., Gambogiæ ℥j., Olei Anisi f℥ss. Let the aloes, colocynth, and gamboge be reduced to a very fine powder, then beat them and the soap with water into a mass, of a proper consistence to divide into pills, each containing three grains." *Ibid.*

Each of these pills contains three grains of the gum-resin. They are a very convenient form for administering assafetida, the unpleasant odour and taste of which render it very offensive in the liquid state. W.

PILULÆ CATHARTICÆ COMPOSITÆ. *U.S.* *Compound Cathartic Pills.*

"Take of Compound Extract of Colocynth *half an ounce;* Extract of Jalap, in powder, Mild Chloride of Mercury [Calomel], each, *three drachms;* Gamboge, in powder, *two scruples.* Mix the powders together; then with water form them into a mass, which is to be beat with the Extract of Colocynth, and divided into one hundred and eighty pills." *U. S.*

This cathartic compound was first made officinal in the last edition of the U.S. Pharmacopœia. It was intended to combine smallness of bulk with efficiency and comparative mildness of purgative action, and a peculiar tendency to the biliary organs. Such an officinal preparation was much wanted in this country, in which bilious fevers and other complaints attended with congestion of the liver and portal circle generally, so much abound. The object of smallness of bulk was accomplished by employing extracts and the more energetic cathartics; that of a peculiar tendency to the liver, by the use of calomel; and that of efficiency with mildness of operation, by the union of several powerful purgatives. It is a fact abundantly proved by experience, that drastic cathartics become milder by combination, without losing any of their purgative power. Nor is it difficult, in this case, to reconcile the result of observation with physiological principles. Cathartic medicines act on different parts of the alimentary canal and organs secreting into it. In small doses, both the irritation which they occasion and their purgative effect are proportionably lessened. If several are administered at the same time, each in a diminished dose, it is obvious that the combined purgative effect of all will be experienced, while the irritation, being feeble in each part affected, and diffused over a larger space, will be less sensible to the patient, and will more readily subside. In the compound cathartic pills, most of the active purgatives in common use are associated together in proportions corresponding to their respective doses, so that an excess of any one ingredient is guarded against, and violent irritation from this cause prevented. The name of the preparation may at first sight seem objectionable, as it might be applied to any compound pills possessing cathartic properties; but when it is considered that the ingredients cannot all be expressed in the title, and no one is sufficiently prominent to give a designation to the whole, and that the preparation is intended as the representative of numerous cathartics, and calculated for a wide range of application, the name will not be considered an inexcusable deviation from ordinary medical nomenclature.

Three of the pills, containing $10\frac{2}{3}$ grains of the mass are a dose for an adult. In this quantity are four grains of compound extract of colocynth, three of extract of jalap, three of calomel, and two-thirds of a grain of gamboge. A single pill will generally be found to operate as a mild laxative. In a full dose, the preparation acts vigorously on the bowels, producing bilious stools, generally without much pain or disorder of the stomach. It may be employed in most instances where a brisk cathartic is required; but is particularly applicable to the early stages of bilious fevers, to hepatitis, jaundice, and all those derangements of the alimentary canal or of the general health which depend on congestion of the portal circle. W.

PILULÆ COLOCYNTHIDIS COMPOSITÆ. *Ed. Dub.* *Compound Pills of Colocynth.*

"Take of Socotrine Aloes, Scammony, each, *eight parts;* Pulp of Colocynth *four parts;* Oil of Cloves, Sulphate of Potassa, each, *one part.* Reduce the Aloes and Scammony, with the Sulphate, to powder; then mix in the Colocynth rubbed to a very fine powder, and the Oil; lastly, beat the whole into a proper mass with Mucilage of Gum Arabic." *Ed.*

"Take of Hepatic Aloes, Scammony, each, *an ounce;* Pulp of Colocynth *half an ounce;* Castile Soap *two drachms;* Sulphate of Potassa, Oil of Cloves, each, *a drachm;* Molasses *a sufficient quantity.* Reduce the Aloes and Scammony to powder with the Sulphate of Potassa; then mix the Pulp of Colocynth and the Oil; and lastly, rub all together into a mass with the Soap and Molasses." *Dub.*

The sulphate of potassa, in these formulæ, is intended to promote the more complete division of the aloes and scammony. The preparation is actively cathartic in the dose of from eight to sixteen grains. W.

PILULÆ COPAIBÆ. *U. S.* *Pills of Copaiba.*

Take of Copaiba *two ounces;* Magnesia, recently prepared, *a drachm.* Mix them, and set the mixture aside till it concretes into a pilular mass, which is to be divided into two hundred pills." *U. S.*

When copaiba is mixed with pure magnesia, it gradually loses its fluid consistence, forming at first a soft tenacious mass, and ultimately becoming dry, hard, and brittle. The quantity of magnesia, and the length of time requisite for the production of this change, vary with the condition of the copaiba, being greater in proportion to the fluidity of this substance, or, in other words, to the amount of volatile oil which it contains. The quantity of magnesia directed by the Pharmacopœia, one-sixteenth of the weight of the copaiba, is sufficient to solidify the latter, as it is often found in the shops, in the course of six or eight hours; but when the copaiba is fresh, or has been kept in closely stopped bottles, and retains, therefore, nearly the whole of its volatile oil, it is necessary either to augment the proportion of magnesia, or to expose the mixture for a much longer time, or to diminish the volatile oil of the copaiba by evaporation. According to M. Fauré, the magnesia combines chemically with the resin, but in relation to the volatile oil, acts merely as an absorbent; for when the solidified mass is submitted to the action of boiling alcohol, a part is dissolved, abandoning the magnesia with which it was mixed, while the resin combined with another portion of the earth remains undissolved. (*Journ. de Pharm.* xvii. 105.) In the preparation of the pills, care should be taken to divide the mass before it has become too hard.

The advantage of this preparation is, that the copaiba is brought to the state of pill with little increase of its bulk. Each pill contains nearly five grains of copaiba, and from two to six may be taken for a dose twice or three times a day. W.

PILULÆ FERRI COMPOSITÆ. *U.S., Lond., Dub.* *Compound Pills of Iron.*

"Take of Myrrh, in powder, *two drachms;* Carbonate of Soda, Sulphate of Iron, each, *a drachm;* Syrup *a sufficient quantity.* Rub the Myrrh with the Carbonate of Soda; then add the Sulphate of Iron, and again rub them; lastly, beat them with the Syrup so as to form a mass, to be divided into eighty pills." *U.S.*

The directions of the British Colleges are essentially the same as the above. The *London* and *Dublin Colleges* order a drachm of brown sugar without syrup; but the reaction of the materials in our climate does not always produce sufficient moisture to give the mass a pilular consistence. The direction for dividing the mass into pills is peculiar to our Pharmacopœia.

This preparation is closely analogous to the Mistura Ferri Composita in properties and composition. It is a good emmenagogue and antihectic tonic. From two to six pills may be given at a dose, three times a day. W.

PILULÆ GALBANI COMPOSITÆ. *Lond., Dub.* PILULÆ ASSÆFŒTIDÆ COMPOSITÆ. *Ed.* *Compound Pills of Galbanum.*

"Take of Galbanum *an ounce;* Myrrh, Sagapenum, each, *an ounce and a half;* Assafetida *half an ounce;* Simple Syrup *a sufficient quantity.* Beat them together till they are thoroughly incorporated." *Lond.*

The *Dublin College* gives the same directions, substituting molasses for the syrup. The *Edinburgh College* takes of assafetida, galbanum, and myrrh, each, *eight parts,* and of rectified oil of amber *one part;* and beats them into a mass with simple syrup.

This compound is given as an antispasmodic and emmenagogue in chlorosis and hysteria. The dose is from ten to twenty grains. W.

PILULÆ GAMBOGIÆ COMPOSITÆ. *Ed., Dub.* PILULÆ CAMBOGIÆ COMPOSITÆ. *Lond.* *Compound Pills of Gamboge.*

"Take of Gamboge, in powder, *a drachm;* Socotrine Aloes, in powder, *a drachm and a half;* Ginger, in powder, *half a drachm;* Soap *two drachms.* Mix the powders together; then add the Soap, and beat the whole together till they are thoroughly incorporated." *Lond.*

The *Dublin* formula differs from the above only in the use of hepatic instead of Socotrine aloes, and in the addition of molasses to impart more readily the pilular consistence.

The *Edinburgh College* takes of gamboge, Socotrine aloes, and compound powder of cinnamon (*aromatic powder*), each, *a drachm,* and of soap *two drachms;* and proceeds in the manner ordered by the London College.

This is an active purgative pill; and may be given in the dose of ten or fifteen grains. The formula is that of Dr. George Fordyce simplified. W.

PILULÆ HYDRARGYRI. *U.S., Lond., Ed., Dub.* *Mercurial Pills. Blue Pills.*

"Take of Purified Mercury *an ounce;* Confection of Roses *an ounce and a half;* Liquorice Root, in powder, *half an ounce.* Rub the mercury with the Confection till all the globules disappear; then add the Liquorice Root and beat the whole into a mass, to be divided into four hundred and eighty pills." *U.S.*

The process of the *London College* is the same with the above, one quarter only of the quantity of materials being used. The *Dublin* process differs from the London only in substituting extract of liquorice root for the root itself. Neither of these Colleges orders the mass to be divided into pills.

"Take of Purified Mercury, Conserve of Red Roses, each, *an ounce;* Starch *two ounces.* Triturate the Mercury with the Conserve, in a glass mortar, till the globules disappear, adding occasionally a little Mucilage of Gum Arabic; then add the Starch and with a little water beat the whole into a mass, to be immediately divided into four hundred and eighty equal pills." *Ed.*

This preparation is very generally known by the name of *blue pill.* Made according to the directions of the U.S., London, and Dublin Pharmacopœias, it contains one grain of mercury in three of the mass; according to those of the Edinburgh, one grain in four. As the pill of our Pharmacopœia contains three grains of the mass, and that of the Edinburgh four grains, the two may be considered equivalent, each having one grain of the metal.

The condition of the mercury in this preparation is a point which has not yet been satisfactorily determined. There is no doubt that by far the greater portion is in the state of minute mechanical division, and not chemically altered. Some maintain that the whole of the metal is in this state, others, that a small portion is converted during the trituration into the black or protoxide of mercury, and that this is the ingredient upon which the activity of the pill depends. The oxidation is attributed partly to the influence of the air upon the surface of the metal, greatly extended by the separation of its particles; partly to the action of the substance used in the trituration. All agree that the efficacy of the preparation is proportionate to the extinction of the mercury, in other words, to the degree in which the metallic globules disappear. This extinction may be effected by trituration with various substances, and manna, syrup, honey, liquorice, mucilage, soap, and guaiac have been recommended, among others, for this purpose; but the confection of roses has been adopted in all the Pharmacopœias, as affording greater facilities and being less liable to objection than any other. The mercury is known to be completely extinguished, when, upon rubbing a small portion of the mass with the end of the finger upon a piece of paper or glass, no metallic globules appear. The powdered liquorice root is added in order to give the due degree of consistence to the mass. The Edinburgh College prefers starch for this purpose, as being less liable to become mouldy when the pills are kept. As the trituration requires to be continued a considerable length of time, and renders the process very laborious, it is customary in Great Britain to prepare the mass by machinery; and at Apothecaries' Hall, in London, the trituration is effected by the agency of steam. The machine there employed consists of "a circular iron trough for the reception of the materials, in which revolve four wooden cylinders, having also a motion on their axis." Much of the *mercurial pill* employed in this country is imported from England.

Medical Properties and Uses. These pills are among the mildest of the mercurial preparations, being less liable than most of the others to act upon the bowels, and exercising the peculiar influence of the remedy upon the system with less general irritation. They are much employed for producing the sialagogue and alterative action of mercury. For the former purpose, one pill may be given two or three times a day; and if the case is urgent, the dose may be increased. Even this preparation sometimes disturbs the bowels. It should then be given combined with a small proportion of opium, or in very minute doses, as half a grain or a grain of the mass repeated every hour or two through the day, so as to allow of its absorption before a sufficient quantity has been administered to act as an irritant. With a view to the alterative effect of the preparation upon the digestive organs, one pill may be given every night, or every other night, at bedtime, and followed in the morning, if the bowels should not be opened, by a small dose of some laxative medicine. The *blue mass* may frequently be administered with advantage, suspended in water by the intervention of thick mucilage; and it forms an excellent addition to the chalk mixture in diarrhœa, particularly that of children, when the biliary secretion is deficient, or otherwise deranged. W.

PILULÆ HYDRARGYRI CHLORIDI MITIS. *U.S.* *Pills of Mild Chloride of Mercury. Calomel Pills.*

"Take of Mild Chloride of Mercury [Calomel] *half an ounce;* Gum Arabic, in powder, *a drachm;* Syrup *a sufficient quantity.* Mix together the Chloride of Mercury and the Gum; then beat them with the Syrup so as to form a mass, to be divided into two hundred and forty pills." *U.S.*

This is a convenient form for administering calomel, of which one grain is contained in each pill. Soap, which was directed in the preparation of this pill in the first edition of the Pharmacopœia, is objectionable on account of its chemical incompatibility with calomel. Mucilage of gum Arabic alone does not form a sufficiently plastic mass; but gum and syrup united, as in the officinal formula, answer admirably well, forming a mass which is easily made into pills, and which readily yields to the solvent power of the stomach. W.

PILULÆ HYDRARGYRI SUBMURIATIS COMPOSITÆ. *Lond.* PILULÆ SUB-MURIATIS HYDRARGYRI COMPOSITÆ. *Ed.* PILULÆ CALOMELANOS COMPOSITÆ. *Dub.* *Compound Pills of Submuriate of Mercury. Compound Calomel Pills.*

"Take of Submuriate of Mercury [Calomel], Precipitated Sulphuret of Antimony, each, *two drachms;* Guaiac, in powder, *half an ounce;* Rectified Spirit *half a drachm.* Rub the Submuriate of Mercury with the Precipitated Sulphuret of Antimony, then with the Guaiac, and add the Spirit to give the proper consistence." *Lond.*

The *Edinburgh* and *Dublin Colleges* agree with the above proportions, but employ only half the quantity of materials, and, for the half drachm of rectified spirit, substitute—the former, a sufficient quantity of mucilage of gum Arabic, the latter, of molasses.

We prefer the name "Compound Calomel Pills" of the Dublin Pharmacopœia; as, though not scientific, it is not, like the others, chemically incorrect. The preparation was originally introduced to the notice of the profession of Dr. Plummer, who found it useful as an alterative, and upon whose authority it was at one time much employed under the name of *Plummer's Pills.* The combination is well adapted to the treatment of chronic rheumatism, and of scaly and other eruptive diseases of the skin, especially when accompanied with a syphilitic taint. Four grains of the mass contain about one grain of calomel. From three to six grains or more may be given morning and evening. W.

PILULÆ OPII. *U.S.* PILULÆ SAPONIS CUM OPIO. *Lond., Dub.* PILULÆ OPIATÆ. *Ed.* *Pills of Opium.*

"Take of Opium, in powder, *a drachm;* Soap, *twelve grains.* Beat them with water so as to form a mass, to be divided into sixty pills." *U.S.*

The *London* and *Dublin Colleges* direct *half an ounce* of opium and *two ounces* of hard soap, to be beat together till thoroughly incorporated. The *Edinburgh College* takes *one part* of opium, *seven parts* of extract of liquorice, and *two parts* of pimento; and having beat the opium and soap into a pulp, adds the pimento, previously powdered, and forms the whole into a mass.

The object of these preparations is different. The process of the U.S. Pharmacopœia is designed merely to furnish a convenient formula for putting opium into the pilular form, preferable to the mode sometimes practised of making the pills directly from the unpowdered mass of opium as found in commerce. The soap answers no other purpose than to give a due consistence, and is therefore in small proportion. Each pill contains a grain of opium.

The processes of the British Colleges are designed to afford a preparation, in which the opium, bearing a small proportion to the whole amount of ingredients, may be conveniently administered, by a division of the pilular mass, in small fractions of a grain. The additions in the Edinburgh preparation, while they dilute the opium, serve also to cover its taste. The name adopted by the London and Dublin Colleges is not appropriate, as opium, though in small proportion as to quantity, is yet the ingredient of greatest importance, and that which gives character to the pill. The London and Dublin preparation contains one grain of opium in five of the mass, that of Edinburgh one grain in ten. W.

PILULÆ QUINIÆ SULPHATIS. *U.S.* *Pills of Sulphate of Quinia.*

"Take of Sulphate of Quinia *an ounce;* Gum Arabic, in powder, *two drachms;* Syrup *a sufficient quantity.* Mix together the Sulphate of Quinia and the Gum; then beat them with the Syrup so as to form a mass, to be divided into four hundred and eighty pills." *U.S.*

Each pill contains a grain of sulphate of quinia, and twelve are equivalent to an ounce of good Peruvian bark. W.

PILULÆ QUINIÆ SULPHATIS IMPURI. *U. S.* *Pills of Impure Sulphate of Quinia.*

"Take of Impure Sulphate of Quinia *an ounce.* Beat it with water so as to form a mass, to be divided into two hundred and forty pills." *U.S.*

Each pill contains two grains of the impure sulphate, and may be considered as equivalent in medical power, to one grain of the pure sulphate of quinia. W.

PILULÆ RHEI COMPOSITÆ. *U.S., Ed.* *Compound Pills of Rhubarb.*

"Take of Rhubarb, in powder, *an ounce;* Aloes, in powder, *six drachms;* Myrrh, in powder, *half an ounce;* Oil of Peppermint *half a fluidrachm;* Syrup of Orange Peel *a sufficient quantity.* Beat the whole together so as to form a mass, to be divided into two hundred and forty pills." *U.S.*

The *Edinburgh College* employs the same ingredients, in the same proportions; but specifies the Socotrine aloes as the variety to be used, and does not divide the mass into pills.

This is a warm tonic laxative, useful in costiveness with debility of stomach. From two to four pills, or from ten to twenty grains of the mass, may be taken twice a day. W.

PILULÆ SCILLÆ COMPOSITÆ. *Lond., Dub.* PILULÆ SCILLITICÆ. *Ed.* *Compound Pills of Squill.*

"Take of Squill Root, fresh dried and powdered, *a drachm;* Ginger Root, in powder, Hard Soap, each, *three drachms;* Ammoniac, in powder, *two drachms.* Mix the powders together; then beat them with the Soap, and add as much Simple Syrup as may be sufficient to give the proper consistence." *Lond.*

The *Dublin College* employs the same ingredients, but adds the ammoniac without previously powdering it, and gives the due consistence by molasses, instead of simple syrup. The *Edinburgh College* takes of powdered squill *a scruple*, powdered ammoniac, cardamom, and liquorice, each, *a drachm;* and forms them into a mass with simple syrup.

This is a stimulant expectorant compound, depending for its virtues chiefly on the squill, and applicable to the treatment of chronic affections of the bronchial mucous membrane. From five to ten grains may be given three or four times a day. The preparation should be made when wanted for immediate use, as the squill which it contains is liable to be injured by keeping. W.

PILULÆ E STYRACE. *Dub.* *Storax Pills.*

"Take of Purified Storax *three drachms;* Turkey Opium, Saffron, each, *a drachm.* Beat them together till they are thoroughly mixed." *Dub.*

In these pills the storax and saffron are added merely to conceal the taste and smell of the opium, as the name of the pills is intended to conceal their real character. This contrivance is esteemed necessary; as some individuals have a prejudice against the use of opium, which reason cannot overcome. Five grains of the mass contain a grain of opium. W.

PILULÆ SUBCARBONATIS SODÆ. *Ed.* *Pills of Subcarbonate of Soda.*

Take of Dried Sub-Carbonate of Soda [carbonate of soda] *four parts;* Hard Soap *three parts.* Beat them into a mass with Simple Syrup." *Ed.*

The carbonate of soda being efflorescent, should always be deprived of its water of crystallization before being made into pills. This form of administering it may sometimes be advantageously resorted to, when the palate or stomach rejects the solution. W.

PILULÆ SULPHATIS FERRI COMPOSITÆ. *Ed.* *Compound Pills of Sulphate of Iron.*

"Take of Sulphate of Iron, in powder *an ounce;* Extract of Chamomile *an ounce and a half;* Oil of Peppermint *a drachm.* Beat them into a mass with Simple Syrup." *Ed.*

This is a good tonic pill, applicable to most complaints in which chalybeates are administered. About two grains of the sulphate are contained in a pill of five grains. W.

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PLUMBUM.

Preparations of Lead.

LIQUOR PLUMBI SUBACETATIS. *U.S., Lond.* PLUMBI SUBACETATIS LIQUOR. *Dub.* *Solution of Subacetate of Lead.*

"Take of Acetate of Lead, Semivitrified Oxide of Lead, each, *eight ounces;* Distilled Water *two pints.* Mix in a glass vessel, and boil for twenty minutes; then filter through paper." *U. S.*

"Take of Semivitrified Oxide of Lead *two pounds;* Diluted Acetic Acid [Distilled Vinegar] *a gallon.* Mix and boil down to six pints, constantly stirring; then set the liquor by that the dregs may subside, and filter." *Lond.*

"Take of Semivitrified Oxide of Lead *one part;* Distilled Vinegar *twelve parts.* Boil together in a glass vessel until eleven parts of the fluid remain, then let the liquor rest, and when the impurities have subsided, let it be filtered." *Dub.*

Crystallized acetate of lead consists of one equivalent of acetic acid 51.48, one of protoxide of lead 111.6, and three of water 27=190.08. Litharge as usually found in the shops is an impure protoxide of lead. When a solution of the former is boiled with the latter, a large quantity of the protoxide is dissolved, and a subacetate of lead is formed which remains in solution. The precise composition of the subacetate varies with the proportions of acetate of lead and of litharge employed. When the quantity of the latter exceeds that of the former by one-half or more, the acetic acid of the acetate unites, according to the highest chemical authorities, with two additional equivalents of protoxide, forming a trisacetate; when the two substances are mixed in proportions corresponding to their equivalent numbers, that is, in the proportion of 190.08 of salt to 111.6 of oxide, or 10 to 6 nearly, only one additional equivalent of protoxide unites with the acid, and a diacetate of lead, according to Dr. Thomson, is produced. As the quantity of litharge directed in the U.S. Pharmacopœia, is intermediate between these proportions, it is probable that the solution which results, contains both the diacetate and trisacetate. The litharge should be employed in the state of very fine powder, and, according to Thenard, should be previously calcined in order to decompose the carbonate of lead, which it always contains in greater or less proportion, and which is not dissolved by the solution of the acetate. We have found by experiment, that the solution is diminished about four fluidounces by the boiling, and that when prepared it has the sp. gr. 1.285 at 60°.

The processes of the London and Dublin Colleges also result in the production of a subacetate of lead, one equivalent of the acetic acid of the vinegar combining directly with two equivalents of the protoxide of the litharge, to form a diacetate. That a trisacetate is not produced may be inferred from the fact ascertained by Dr. Barker, that distilled vinegar dissolves only about one-twelfth of its weight of the litharge, which is not nearly sufficient to afford three equivalents of protoxide to one of the acid. Besides, according to Phillips and Duncan, the resulting salt has been proved by the analysis of Dr. Bostock to be composed of one equivalent of acid and two of base. The quantity of litharge directed by the London College is much larger than necessary, not one-half of it being dissolved by the distilled vinegar. The strength of the solution necessarily varies with the strength of the vinegar, and this is an objection against the British processes, to which ours is not equally liable. We are told by Phillips, that the sp. gr. of the solution prepared with distilled vinegar of 1.007 is 1.220, with that of 1.009 is 1.309; while Dr. Barker states the specific gravity of the saturated solution prepared by himself with distilled vinegar, to be only 1.118 at 68°. Common vinegar yields a dark brown solution, and is therefore not employed.

Properties. The solution of subacetate of lead of the U.S. Pharmacopœia is colourless, that of the British Colleges has a pale greenish-straw colour, arising from impurities in the distilled vinegar. Its taste is sweetish and astringent. When concentrated by evaporation, it deposites on cooling crystalline plates, which, according to Dr. Barker, are flat rhomboidal prisms with dihedral summits. It has an alkaline reaction, tinging the syrup of violets green, and reddening turmeric paper. One of its most striking properties is the extreme facility with which it is decomposed. Carbonic acid throws down a white precipitate of carbonate of lead, and this happens by mere exposure to the air, or by mixture even with distilled water, if this has had an opportunity of absorbing carbonic acid from the atmosphere. It affords precipitates also with the alkalies, alkaline earths, and their carbonates, with sulphuric and muriatic acids free or combined, with hydrosulphuric acid and the hydrosulphates, and, according to Thenard, with solutions of all the neutral salts. Solutions of gum, tannin, most vegetable colouring principles, and many animal substances, produce with it precipitates consisting of the substance added and oxide of lead. It should be kept in well stopped bottles.

Medical Properties and Uses. This solution is astringent and sedative; but is employed only as an external application. It is highly useful in inflammation arising from sprains, bruises, burns, blisters, &c., to which it is applied by means of linen cloths, which should be removed as fast as they become dry. It always, however, requires to be diluted. From four fluidrachms to a fluidounce, added to a pint of distilled water, forms a solution sufficiently strong in ordinary cases of external inflammation. When applied to the skin denuded of the cuticle, the solution should be still weaker, as constitutional effects might result from the absorption of the lead. Paralysis is said to have been produced by its local action; but we have not witnessed such an effect. The solution has the common name of *Goulard's extract*, derived from a surgeon of Montpellier by whom it was introduced into notice. W.

LIQUOR PLUMBI SUBACETATIS DILUTUS. *U.S., Lond.* PLUMBI SUBACETATIS LIQUOR COMPOSITUS. *Dub. Diluted Solution of Subacetate of Lead. Lead-water.*

"Take of Solution of Subacetate of Lead *a fluidrachm;* Distilled Water *a pint.* Mix them." *U.S.*

The *London* and *Dublin* processes differ from the above only in adding a fluidrachm of proof spirit to the other ingredients.

This preparation is convenient, as in consequence of the subsidence of the carbonate of lead usually formed on the dilution of the strong solution, it enables the apothecary to furnish clear lead-water when it is called for. The strength, however, is hardly sufficient for the ordinary purposes to which lead-water is applied. The Paris Codex directs two drachms of the strong solution to a pound of distilled water, and an ounce of alcohol of 22° Baumé; and thus forms the *vegeto-mineral water* of Goulard. The minute proportion of proof spirit added by the British Colleges can have no sensible effect. W.

POTASSA.

Preparations of Potassa.

LIQUOR POTASSÆ. *U. S., Lond.* AQUA POTASSÆ. *Ed.* POTASSÆ CAUSTICÆ AQUA. *Dub. Solution of Potassa.*

"Take of Carbonate of Potassa *a pound;* Lime, fresh burnt, *half a pound;* Boiling Distilled Water *a gallon.* Dissolve the Carbonate of Potassa in two pints of the Water, and add the remainder to the Lime. Mix the hot liquors; then set the mixture aside in a covered vessel, and when cold strain it through a cotton cloth. If effervescence be produced upon the addition of a diluted acid, more lime should be added, and the liquor again strained. A pint of this solution should weigh sixteen ounces." *U. S., Lond.*

"Take of recently burnt Lime *eight ounces;* Sub-Carbonate of Potassa *six ounces:* Boiling Water *twenty-eight ounces.* Pour upon the Lime, in an iron or earthen vessel, twenty ounces of the Water. After the ebullition has ceased, immediately add the Salt, dissolved in eight ounces of the Water; and having thoroughly mixed the materials, cover the vessel until they cool. When the mixture has cooled, stir it well, and pour it into a glass funnel, the throat of which is obstructed with a piece of clean linen. Cover the upper orifice of the funnel and insert its tube into another glass vessel, so that the Water of Potassa may gradually drop, through the linen, into the lower vessel. As soon as it ceases to drop, pour into the funnel some ounces of water, but cautiously, so that it may swim above the matter in the funnel. The Water of Potassa will again begin to drop; and the affusion of water is to be repeated in the same manner, until three pounds have dropped, which will happen in the space of two or three days. Then mix the superior and inferior parts of the liquor together by agitation, and keep it in a well stopped bottle." *Ed.*

Take of Carbonate of Potassa from Pearlash, fresh-burnt Lime, each, *two parts;* Water *fifteen parts.* Sprinkle one part of the Water, previously heated, on the Lime, placed in an earthen vessel; and when it is slaked, mix the salt with it immediately, and then add the remainder of the Water. When the mixture has cooled, put it into a well stopped bottle, and shaking it frequently, keep it for three days. When the Carbonate of Lime has subsided, decant the supernatant liquor, and keep it in green glass bottles, well stopped. The specific gravity of this solution is 1.080." *Dub.*

The object of these processes is to separate carbonic acid from the carbonate of potassa, so as to obtain the alkali in a caustic state. This is effected by hydrate of lime; and the chemical changes which take place are most intelligbly explained by supposing the occurrence of a double decomposition. The lime of the hydrate of lime, by its superior affinity, combines with the carbonic acid, and precipitates as carbonate of lime; while the water of the hydrate unites with the potassa, and remains in solution as the hydrate of potassa. The proportion indicated by theory for this decomposition would be 69.27 of the carbonate to 28.5 of lime, or one equiv. of each; but in practice it is found necessary to use an excess of lime. In the U.S. and London process, the alkaline salt is treated with half its weight of lime, in the Dublin formula with its own weight; and in the Edinburgh, with one and a third times its weight; proportions, even the lowest of which exceeds the theoretical quantity. From the experiments of Dr. Barker it appears, that the carbonate of potassa, to be fully decomposed, requires at least five-sixths of its weight of lime, with the aid of a sufficient quantity of water to promote the chemical reaction. Hence it may be inferred, that the medium proportion of lime ordered by the Dublin College is the most eligible in practice. The Edinburgh proportion is certainly excessive; and any defect in the preparation, arising out of the deficient action of the lime in the U.S. and London formula, is remedied by the direction to add more lime, in case the solution, as first obtained, should effervesce with acids. The disadvantages of using an excess of lime are the necessity of employing larger vessels, on account of the bulk of the materials, and the loss of a portion of alkaline solution which is retained by the spongy residuum. The proportion of water employed has a decided influence on the result. If the water be deficient in quantity, the decomposing power of the lime, on account of its sparing solubility, will be lessened; and more of it will be required to complete the decomposition of the carbonate, than if the solutions had been more dilute. The quantity ordered in the U.S. and London formula is ample, being more than ten times the weight of the alkaline salt employed, but is deficient in the Edinburgh process. The plan of agitation and decantation, pursued by the Dublin College, is better than straining or filtration; as these latter operations give rise to a longer exposure to the air, and consequently increase the liability of the solution to absorb carbonic acid. Filtration, however, may be performed, so as to prevent the contact of any air, except that contained in the filtering apparatus itself, by pursuing the method described at page 692. The direction of the Dublin College to keep the solution of potassa in green glass bottles is judicious; as white glass is slightly acted on.

As the solution of potassa is frequently made by the operative chemist in considerable quantities, the following details as to the best mode, according to Berzelius, of conducting the process, may not be without their use. Dissolve one part of carbonate of potassa in from seven to twelve parts of water, in a bright iron vessel, and decant the solution after it has become clear by standing. Boil the solution in an iron vessel, and while it is boiling, add, at intervals small quantities of slaked lime reduced to a thin paste with water; allowing the solution to boil a few minutes after each addition. One and a half parts of pure lime will be more than sufficient to decompose one part of the carbonate. When about half the hydrate of lime has been added, take out about a teaspoonful of the boiling solution, and after dilution, and filtration through paper, test it by adding it to some nitric acid, or by mixing it with an equal bulk of lime-water. If the solution has not been completely freed from carbonic acid, the first reagent will cause an effervescence, and the second a milky appearance; in either of which events the addition of the lime must be continued as before, until the above mentioned tests give negative indications. In performing this operation, two advantages are gained by keeping the solution constantly boiling. One is that the carbonate of lime formed is in this way rendered granular and heavy, and more disposed to subside; and the other, that it prevents the precipitated carbonate from coalescing into a mass at the bottom of the vessel, an occurrence which causes the ebullition, when subsequently renewed, to take place imperfectly and by jerks.

Properties, &c. Solution of potassa is a limpid, colourless liquid, of an oleaginous appearance, without smell, and having a very acrid and caustic taste. It acts rapidly on animal and vegetable substances, and when rubbed between the fingers produces a soapy feel, in consequence of a partial solution of the cuticle. It dissolves gum, resins, and extractive matter, and, by union with oily and fatty bodies, forms soap. The officinal solution is never perfectly pure, but contains either some undecomposed carbonate, or free lime, in addition to minute portions of sulphate and muriate of potassa, silica, and alumina, impurities usually present in the carbonate of potassa obtained from pearlash, which is used in its preparation. Undecomposed carbonate may be detected in the manner explained in the preceding paragraph, and free lime, by the production of a milky appearance on the addition of a few drops of carbonate of potassa, which serves to precipitate the lime as a carbonate. It is incompatible with acids, acidulous salts, and all metallic and earthy preparations held in solution by an acid; as also with all ammoniacal salts, and with calomel and corrosive sublimate. This solution, as it is intended for medicinal employment, should be of uniform strength. The weight which a pint of it is directed to have in the U.S. and London Pharmacopœias, indicates a sp. gr. of 1.056. The Dublin solution is ordered to be of the sp. gr. 1.08; while the density of the Edinburgh preparation is not designated. These solutions are quite dilute; for, according to a table given by Dalton, a solution having the sp. gr. 1.06, contains only 4.7 per cent. of the alkali. On account of its strong attraction for carbonic acid, the solution of potassa should be carefully preserved from the contact of the air. B.

Medical Properties and Uses. Solution of potassa is antacid, diuretic, and antilithic. It has been much employed in calculous complaints, under the impression that it has the property of dissolving urinary concretions in the kidneys and bladder; but experience has proved that the stone once formed cannot be removed by remedies internally administered, and the most that the alkaline medicines can effect, is to correct that disposition to the superabundant secretion of uric acid, or the insoluble urates, upon which gravel and stone often depend. For this purpose, however, the carbonated alkalies are preferable to caustic potassa, as they are less apt to irritate the stomach, and to produce injurious effects when long continued. It has been proposed to dissolve calculi by injecting immediately into the bladder the solution of potassa in a tepid state, and so much diluted that it can be held in the mouth; but this mode of employing it has not been found to answer in practice. This solution has also been highly recommended in lepra, psoriasis, and other cutaneous affections; and is said to have proved peculiarly useful in scrofula; but in all these cases it probably acts simply by its antacid property, and is not superior to the carbonate of potassa or of soda. Externally it has been used in a diluted state as a stimulant lotion in rachitis and arthritic swellings, and concentrated, as an escharotic in the bite of rabid or venomous animals. The dose is from ten to thirty minims, repeated two or three times a day, and gradually increased in cutaneous affections to one or two fluidrachms; but the remedy should not be too long continued, as it is apt to debilitate the stomach. It may be given in sweetened water or some mucilaginous fluid. Veal broth and table beer have been recommended as vehicles; but the fat usually present in the former, would be liable to convert it into soap, and the acid in the latter would neutralize it. In dyspeptic cases it may be associated with the simple bitters.

It is employed pharmaceutically in the preparation of the Precipitated Sulphuret of Antimony, and by the Dublin College in forming the Black Oxide of Mercury.

Off. Prep. Potassa, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Potassa cum Calce, *Lond.*, *Ed.*, *Dub.;* Potassii Iodidum, *U.S.* W.

POTASSA. *U.S. Ed.* POTASSA FUSA. *Lond.* POTASSA CAUSTICA. *Dub.* *Potassa.* *Caustic Potassa.*

"Take of Solution of Potassa *a gallon.* Evaporate the water in a clean iron vessel, over the fire, till ebullition ceases, and the Potassa melts. Pour this into suitable moulds." *U.S.*

The *London* formula is the same as the above, except that it directs that the melted potassa should be "poured out upon an iron plate into pieces of a proper form."

"Take of Solution of Potassa *any quantity.* Evaporate it in a very clean covered iron vessel, until, on the ebullition ceasing, the saline matter flows gently like oil, which happens before the vessel becomes red hot. Then pour it out on a clean iron plate, and before it hardens, cut it into small pieces, which are immediately to be put into a well stopped bottle." *Ed.*

"Take of Water of Caustic Potassa *any quantity.* Evaporate it over the fire in a perfectly clean silver or iron vessel, until the ebullition shall have ceased, and the saline matter, on increasing the heat, shall remain perfectly at rest in the vessel. Pour out the liquified Potassa on a silver or iron plate, and, whilst concreting, cut it into pieces of a proper size, which are immediately to be introduced into a well stopped bottle. The operator should carefully avoid the drops which are ejected from the vessel during the evaporation." *Dub.*

The concrete alkali obtained by these processes, is a hydrate of potassa, sufficiently pure for medical purposes. The solution of the alkali freed from carbonic acid having been obtained by another formula, (see *Liquor Potassæ,*) the formation of the present preparation requires merely the evaporation of this solution, until the whole of its uncombined water is driven off. The evaporation is required to be performed in metallic vessels, as those of glass or earthenware are acted on by the alkali; and it should be completed as quickly as possible to abridge the period during which the solution would be liable to absorb carbonic acid from the atmosphere. When poured out on a metallic plate, the cake just as it concretes may be marked with a knife in the directions in which it is to be divided; and when cold, it readily breaks in those directions. A better plan, however, is to run the fused alkali, as directed in the U.S. formula, into suitable moulds. These should be made of iron and have a cylindrical shape, which is the most convenient form of the alkali for the use of the surgeon. Green glass bottles with ground stoppers are the best adapted for preserving this preparation; as white flint glass is slightly acted on.

Properties, &c. In its officinal impure form, potassa has usually a dingy gray or green colour, occasionally a bluish tint, and the peculiar odour of slaking lime. It is extremely caustic and very deliquescent, and dissolves in less than its weight of water. It is also readily soluble in alcohol. When exposed to a low red heat it melts, and at bright redness is volatilized. On account of its deliquescent property, and its strong attraction for carbonic acid, it requires to be kept in very accurately stopped bottles. In the state here described, the alkali always contains combined water as a part of its composition. It contains also several impurities, such as sulphate of potassa, chloride and peroxide of potassium, peroxide of iron, lime, and a portion of the alkali itself still in a carbonated state. It may be freed from these impurities by digesting it in alcohol, which will take up only the pure hydrated alkali, evaporating the alcoholic solution to dryness, and fusing the dry mass obtained. *Pure hydrate of potassa*, when thus procured, is usually called *alcoholic potassa.* It is generally in the form of flat white pieces, which are dry, hard, and brittle, and extremely caustic. Its other properties are similar to those of the impure hydrate above described. It may be discriminated from the other fixed alkalies (soda and lithia) by affording, when in solution, a crystalline precipitate (cream of tartar) with an excess of tartaric acid, and a yellow one with muriate of platinum. The officinal potassa, apart from impurities, consists of one equiv. of dry potassa 47.15 and one of water 9=56.15. Dry potassa is formed of one equiv. of potassium 39.15 and one of oxygen 8=47.15. (See *Potassium.*) B.

Medical Properties and Uses. This is the old *causticum commune acerrimum*, or strongest common caustic. It is a very powerful escharotic, quickly destroying the life of the part with which it comes in contact, and extending its action to a considerable depth beneath the surface. In this latter respect, it differs from the nitrate of silver or lunar caustic, to which it is, therefore, preferred for the purposes of forming issues and opening abscesses. It is sometimes used for removing stricture of the urethra; but in consequence of its tendency to spread, it may, unless carefully applied, produce such a destruction of the lining membrane, as to open a passage for the urine into the cellular membrane, and thus involve the patient in danger. The most convenient mode of employing the caustic for the formation of an issue, is to apply to the skin a piece of linen spread with adhesive plaster, having a circular opening in its centre corresponding to the intended size of the issue, and then to rub upon the skin within the opening a piece of the caustic previously moistened at one end. The application is to be continued till the life of the part is destroyed, when the caustic should be carefully washed off by a wet sponge or wet tow, or neutralized by vinegar. The preparation is also employed for forming solutions of potassa of definite strength, whether for medicinal or pharmaceutic use. A solution of one drachm and a half of caustic potassa in two fluidounces of distilled water, is highly recommended by Dr. Hartshorne, as an application to the spine in tetanus. It may be applied by means of a sponge attached to the end of a stick, which should be drawn quickly along the back from the nape of the neck to the sacrum. It produces a very powerful rubefacient effect.

The U.S. Pharmacopœia employs caustic potassa in the preparation of the black oxide of mercury. W.

POTASSA CUM CALCE. *Lond., Ed.* POTASSA CAUSTICA CUM CALCE. *Dub.* *Potassa with Lime.*

"Take of Solution of Potassa *three pints;* fresh-burnt Lime *a pound.* Boil down the Solution of Potassa to a pint; then add the Lime, previously slaked with water, and mix them thoroughly." *Lond.*

"Take of Water of Potassa *any quantity.* Evaporate it to one-third in a covered iron vessel; then mix with it as much newly slaked and powdered lime as will bring it to the consistence of a solid paste, which is to be preserved in a well stopped bottle." *Ed.*

"Evaporate Water of Caustic Potassa to one-fourth; then add as much fresh-burnt Lime, in powder, as will form a mass of the proper consistence, which is to be preserved in a well stopped bottle." *Dub.*

In making this preparation, the alkaline solution is so far concentrated, as that, upon the addition of the lime, and the cooling of the mixture, the whole becomes a granular mass, consisting of the mixed hydrates of potassa and lime. Potassa with lime, like the officinal potassa, is only used as a caustic; but it is more manageable than the latter preparation, owing to the presence of the lime, which renders it milder and slower in its operation, and also less deliquescent, and, therefore, less liable to spread beyond the part intended to be affected. This preparation was formerly called *causticum commune mitius*, or milder common caustic. B.

POTASSÆ CARBONAS. *U.S.* POTASSÆ SUBCARBONAS. *Lond.* SUB-CARBONAS POTASSÆ. *Ed.* POTASSÆ CARBONAS E LIXIVO CINERE. *Dub.* *Carbonate of Potassa. Subcarbonate of Potassa. Carbonate of Potassa from Pearlash.*

"Take of Impure Carbonate of Potassa [pearlash], in powder, *three pounds;* Water *two pints and a half* [boiling Water three pints and a half, *Lond.*]. Dissolve the Impure Carbonate of Potassa in the Water, and filter the solution; then pour it into a clean iron vessel, and evaporate the Water over a gentle fire till the solution thickens; lastly, remove it from the fire, and stir it constantly with an iron spatula, till the salt granulates." *U.S., Lond.*

"Subcarbonate [Carbonate, *U.S.*] of Potassa may be obtained in a similar manner from Tartar, previously burnt till it becomes of an ash colour." *Note to the Lond. formula.*

"Expose Impure Sub-Carbonate of Potassa [pearlash], in a crucible, to a red heat; then triturate it well with an equal weight of water. Pour the solution, after the impurities have subsided, into a very clean iron pot, and boil it to dryness; stirring the salt assiduously towards the end of the process, to prevent it from adhering to the vessel." *Ed.*

"Take of Pearlash, in coarse powder, cold Water, each, *one part.* Mix them by trituration, and macerate for a week, in a wide vessel, with occasional agitation. Then filter the lixivium, and evaporate it to dryness in a very clean silver or iron vessel. Towards the end of the evaporation, stir the saline mass constantly with an iron spatula. In this manner, having reduced it to a coarse powder, preserve it in close vessels. If the Pearlash is not sufficiently pure, roast it in a crucible until it becomes white, before dissolving it in the Water." *Dub.*

The object of the above processes is to purify the impure carbonate of potassa, or pearlash. This generally contains certain insoluble impurities, as well as small portions of sulphate and silicate of potassa, and chloride of potassium, as explained under another head. (See *Potassæ Carbonas Impurus.*) By dissolving it in a due proportion of water, and filtering the solution, the insoluble impurities are got rid of, as well as the greater part of the foreign salts, which being much less soluble than the carbonate of potassa, are excluded by the superior affinity of this salt for the water. The proper way of conducting the purification is to mix the impure carbonate with an equal weight of *cold* water, and to allow the mixture to stand for a day or two, stirring it frequently to promote the action of the water. The clear liquor, obtained by decantation or filtration, is then evaporated to dryness. The U.S., Edinburgh, and Dublin processes are conducted very much in this way; cold water being employed, and equal weights of alkali and water being used in the Edinburgh and Dublin formulæ, and nearly equal weights in the process of the U.S. Pharmacopœia. The London College has committed an error in ordering a larger proportion of water, and in directing it to be boiling. The prolonged contact of the water with the salt, and the occasional stirring of the mixture ordered by the Dublin College, are useful directions. In no case should the undissolved residue be washed with a fresh portion of water, as, by such a proceeding, the foreign salts, which it is the object of the process to separate, would be dissolved. Iron or silver vessels are directed, because these metals are not acted on by the alkali, while glass is attacked by it. Mr. Phillips says copper vessels are generally preferred, and may be used without inconvenience. In granulating the salt by stirring, it is better to keep it on the fire until the process is finished, than to remove it at the moment it thickens.

According to Berzelius, a more productive process for purifying pearlash, though the salt is not so pure as when obtained by the process just described, is to dissolve the impure salt in more than its weight of water, to evaporate the solution till it has the density of 1.52, and then to put it in a cool place, that the foreign salts, principally muriate and sulphate of potassa, may crystallize. The solution is then decanted, and evaporated to dryness.

Properties, &c. Carbonate of potassa, as found in the shops, is in the form of a coarse white granular powder, having a nauseous, alkaline taste, and acting as an alkali on vegetable colours. It is very soluble in water, dissolving in its weight of that liquid; but is insoluble in alcohol. It is extremely deliquescent, and hence, a porton of it exposed to the air for some time, attracts so much water as completely to dissolve into an oily liquid, called by the older chemists, *oleum tartari per deliquium.* On account of this property, carbonate of potassa should be kept in bottles with accurately ground stoppers. If exposed, in its usual state, to a red heat, it retains its carbonic acid, but loses from ten to fifteen per cent. of water, which appears to be hygrometric, and not chemically combined. It should be completely soluble in water, and any insoluble residue is indicative of impurity. The usual impurities are some earthy matter, and about three per cent. of the muriate and sulphate of potassa, with a little silica in the state, probably, of silicated potassa; but the presence of these substances in so small an amount does not interfere with its medical efficacy. It is incompatible with acids and acidulous salts, muriate and acetate of ammonia, lime-water and muriate of lime, sulphate of magnesia, alum, tartar emetic, nitrate of silver, ammoniated copper and ammoniated iron, sulphate of iron and tincture of muriate of iron, calomel and corrosive sublimate, acetate and subacetate of lead, and sulphate of zinc. It is not decomposed by the tartrate of iron and potassa, and, therefore, may be associated with it in prescriptions.

Composition. Carbonate of potassa, as obtained by evaporation to dryness, is an anhydrous salt, consisting of one equiv. of carbonic acid 22.12, and, one of potassa 47.15=69.27. As it is neutral in composition, the name by which it is designated in the U.S. and Dublin Pharmacopœias is strictly correct. The possession of an alkaline reaction cannot justify its being called a *sub*carbonate; since, on the same ground, the bicarbonate would be a subcarbonate, as it possesses an alkaline reaction also. B.

Medical Properties and Uses. Purified pearlash is the form of carbonate of potassa usually employed in this country, where it is frequently, though incorrectly, called *salt of tartar*, the latter name being strictly applicable to the purer carbonate, obtained by decomposing cream of tartar. It is occasionally used as an antacid in dyspepsia, as a diuretic in dropsy, and as an antilithic in gravel attended with red deposites from the urine; but the purpose to which it is most commonly applied is the formation of the *neutral mixture* and *effervescing draught*. (See page 395.) It is worthy of observation, that its solution, on exposure to the air, or on the addition of an acid, deposites flocculi consisting of hydrate of silica, resulting from the decomposition of the silicated potassa, which is always present as an impurity. The spontaneous deposition of silica is owing to the absorption of carbonic acid. Carbonate of potassa is also used with much advantage in some cases of jaundice, in which it probably operates by entering the circulation and directly exciting the hepatic function. The dose is from ten to thirty grains, given in some aromatic water sweetened with sugar.

Off. Prep. Liquor Potassæ, *U.S.*, *Lond.*, *Ed.;* Liquor Potassæ Carbonatis, *U. S.*, *Lond.*,*;* Magnesiæ Carbonas, *Lond.*, *Ed.*, *Dub.;* Mistura Ferri Comp., *U. S.*, *Lond.*, *Dub.;* Potassæ Acetas, *Lond.;* Potassæ Bicarbonas, *Dub.;* Potassæ Bisulphas, *Dub.;* Potassæ Sulphas, *Lond.*, *Dub.;* Potassæ Sulphuretum, *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

POTASSÆ CARBONAS PURISSIMUS. *U.S.* SUB-CARBONAS POTASSÆ PURISSIMUS. *Ed.* POTASSÆ CARBONAS E TARTARI CRYSTALLIS. *Dub.* *Purest Carbonate of Potassa. Carbonate of Potassa from Crystals of Tartar. Salt of Tartar.*

"Take of Supertartrate of Potassa [cream of tartar] *two pounds;* Nitrate of Potassa *a pound.* Rub them separately into powder; then mix, and throw them into a brass vessel heated nearly to redness, that they may undergo combustion. From the residue prepare the Purest Carbonate of Potassa, in the manner directed for the Carbonate." *U. S.*

"Take of Impure Super-Tartrate of Potassa [crude tartar] *any quantity.* Wrap it up in moist bibulous paper, or put it into a crucible, and having surrounded it with live coals, burn it into a black mass. Reduce this to powder, and expose it, in an open crucible, to the action of a moderate fire, until it becomes white, or at least of an ash colour; care being taken that it do not melt. Then dissolve it in warm water, strain the solution through a linen cloth, and evaporate it in a clean iron vessel, diligently stirring it towards the end of the process with an iron spoon to prevent the matter from adhering to the bottom of the vessel. A very white salt will remain, which is to be left a little longer on the fire, until the bottom of the vessel becomes nearly red. Lastly, when the salt has grown cold, keep it in well stopped glass vessels." *Ed.*

"Take of Crystals of Tartar *any quantity.* Heat them to redness in a silver crucible, loosely covered, until they cease to emit vapours. Reduce the residue to a coarse powder, and roast it for two hours in the same crucible, without a cover, stirring it frequently; then boil it with twice its weight of water for a quarter of an hour, and after the requisite subsidence, pour off the clear liquor. Repeat this three times. Filter the mixed solutions, and evaporate them in a silver vessel. Granulate the residual salt by frequently stirring it while it is becoming dry, and then heat it to dull redness. Before it is perfectly cold, take it out of the vessel, and preserve it in well stopped bottles." *Dub.*

The product of the above processes is a carbonate of potassa, purer than that described under the preceding head. In the U.S. formula the salts employed undergo decomposition by the deflagration to which they are subjected; the tartaric and nitric acids are totally decomposed, and sufficient carbonic acid is formed, as one of the products of their decomposition, to saturate the common base of the two salts, and thus to generate carbonate of potassa. This, however, is mixed with a portion of redundant charcoal, which gives the product a black colour; and from its colour and use in this state it was formerly called *black flux*. It is freed from carbonaceous matter by being treated in the manner directed for purifying the carbonate obtained from pearlash.

The Edinburgh and Dublin Colleges form this carbonate by incinerating the supertartrate without nitre. The tartaric acid, which consists of hydrogen, carbon, and oxygen, is decomposed, and gives rise, among other products, to carbonic acid, which combines with the potassa. The matter, after ignition, contains, besides carbonate of potassa, certain impurities derived from those pre-existing in the supertartrate. These are carbonate of lime, arising from the decomposition of tartrate of lime, alumina, silica, and minute portions of the oxides of iron and manganese; and being all insoluble in water, are left behind when the mass is acted on by that liquid, the alkaline carbonate alone being taken up. The insoluble matter is greater in the incinerated mass of the Edinburgh process than in that of the Dublin; as crude tartar is employed in the former, while crystals of tartar are used in the latter.

The London College does not recognise a separate preparation under the name of "purest carbonate of potassa," but gives the formula for obtaining it as an additional method for preparing their "subcarbonate of potassa." (See *preceding article.*)

Properties, &c. Carbonate of potassa obtained from tartar differs from the same salt procured from pearlash, only in containing fewer impurities. It was formerly called *salt of tartar*, in allusion to its source; but at present, the same name is familiarly applied to any carbonate of potassa of good quality, without reference to its mode of preparation. It may, indeed, be very much doubted whether the real salt of tartar is often kept in our shops; the carbonate as purified from pearlash being generally substituted for it, and answering every medicinal purpose that could be expected from the use of the purer salt.

Medical Properties and Uses. These are precisely the same with those of the carbonate of potassa described in the preceding article.

Off. Prep. Aqua Super-Carbonatis Potassæ, *Ed.;* Carbonas [Bicarbonas] Potassæ, *Ed.;* Liquor Potassæ Arsenitis, *U.S.*, *Lond.*, *Ed.*, *Dub.;* Potassæ Acetas, *Dub.;* Potassæ Carbonatis Aqua, *Dub.* B.

LIQUOR POTASSÆ CARBONATIS. *U.S.* LIQUOR POTASSÆ SUBCARBONATIS. *Lond.* POTASSÆ CARBONATIS AQUA. *Dub.* *Solution of Carbonate of Potassa. Solution of Subcarbonate of Potassa.*

"Take of Carbonate of Potassa *a pound;* Distilled Water *twelve fluidounces.* Dissolve the Carbonate of Potassa in the Water, and filter the solution through paper." *U.S.*, *Lond.*

"Take of Carbonate of Potassa from Crystals of Tartar *one part;* Distilled Water *two parts.* Dissolve and filter. The specific gravity of this solution is 1.320." *Dub.*

This is simply a solution of carbonate of potassa in water, and furnishes a convenient form for the administration of this salt. The U.S. and London process gives a liquid of the sp. gr. 1.446. The Dublin process differs in using the purer form of the carbonate, and in furnishing a solution considerably weaker. This solution should be colourless and inodorous, and possess the general alkaline qualities of the salt from which it is formed. The dose of the U.S. solution is from ten minims to a fluidrachm, sufficiently diluted with water or some bland liquid.

Off. Prep. Potassæ Bicarbonas, *U.S.*, *Lond.;* Potassæ Hydriodas, *Dub.*

B.

POTASSÆ BICARBONAS. *U.S.*, *Dub.* POTASSÆ CARBONAS. *Lond.* CARBONAS POTASSÆ. *Ed.* *Bicarbonate of Potassa.*

"Take of Solution of Carbonate of Potassa [Solution of Subcarbonate of Potassa, *Lond.*] *a gallon.* Pass Carbonic Acid through the Solution, in a suitable vessel, till it is fully saturated; then filter, and evaporate the filtered liquor, that crystals may form, taking care that the heat does not exceed one hundred and twenty degrees. Pour off the liquor, and dry the crystals upon bibulous paper. Carbonic Acid is obtained from Hard Carbonate of Lime [White Marble, *Lond.*], by the addition of Dilute Sulphuric Acid." *U.S.*, *Lond.*

"Take of Purest Sub-Carbonate of Potassa [salt of tartar] *two parts;* Water *three parts.* Dissolve the salt in the Water, and, in a suitable apparatus, pass through it a stream of Carbonic Acid Gas. Filter the solution when it ceases to absorb acid, and afterwards evaporate it with a heat not exceeding one hundred and eighty degrees, so that crystals may form. Carbonic Acid is easily obtained from equal weights of Carbonate of Lime in powder, and Sulphuric Acid diluted with much water." *Ed.*

"Take of Carbonate of Potassa from Pearlash *one part;* Distilled Water *two parts.* Dissolve, and expose the solution, in a suitable apparatus, to a current of Carbonic Acid Gas, evolved from white marble by the action of dilute Muriatic Acid, until the liquid becomes turbid. Then filter it, and again expose it to the stream of Carbonic Acid Gas, until the alkali is saturated. Lastly, put the solution in a cool place, that it may form crystals, which are to be dried without heat, and kept in a well stopped bottle." *Dub.*

In these processes, the *regular* carbonate of potassa, consisting of one equiv. of acid and one of base, erroneously called a subcarbonate by the London and Edinburgh Colleges, is combined with an additional equivalent of carbonic acid. The combination is effected by passing a stream of this acid through a solution of the carbonate, so long as it is absorbed. The solution employed is directed of different strengths. In the U.S. and London formula, the officinal solution of the carbonate being ordered, the salt and water exist in nearly equal parts; in the Edinburgh formula, they are to each other as 2 to 3, and in the Dublin, as 1 to 2. The Edinburgh differs from the other Pharmacopœias in using the purest form of the officinal carbonate for forming the solution. The saturation is best performed on a small scale in a Wolfe's apparatus, with wide connecting tubes to prevent their being obstructed by the crystals; and on a large scale, in strong vessels, into which the carbonic acid may be driven by means of a forcing pump. During the progress of the saturation, the greater part of the silica which may happen to be associated with the alkali as an impurity, is precipitated; and hence the solution generally becomes turbid. It is to remove this earth that filtration is directed.

The processes of the different Pharmacopœias appear to have several defects. Both Mr. Phillips and Mr. Brande are of opinion that the carbonate should be dissolved in at least five times its weight of water, a quantity of menstruum requisite to accommodate the comparatively sparing solubility of the bicarbonate. The disadvantages of using too little water, are that some sesquicarbonate is apt to be generated, and that the bicarbonate is inconveniently precipitated, in the form of a crystalline deposite, in the progress of the operation. Hence it is that in the two first processes quoted, so far from evaporation being necessary, as directed by them, to form crystals, there is a deficiency of water in the product to hold the crystals already formed in solution. The Dublin process is less obnoxious to this objection; as a larger proportion of water is used, and no heat applied. The true principles which should regulate the strength of the alkaline solution, is to have sufficient water to prevent the premature crystallization of the solution, and yet so much as to render evaporation with much heat necessary to bring it to the crystallizing point. The evaporation, when performed, must be done at a gentle heat; as at a high temperature the salt loses one-fourth of its carbonic acid and becomes a sesquicarbonate.

According to Mr. Phillips, muriatic acid is preferable to sulphuric, for disengaging the carbonic acid from the carbonate of lime; inasmuch as the former generates a soluble salt, while the latter, by giving rise to the insoluble sulphate of lime, interferes with the rapid and complete decomposition of the calcareous salt. This writer also suggests that the muriate of lime may be decomposed by sulphuric acid so as to recover the muriatic acid for future employment. In small operations, there can be no doubt that the muriatic acid, diluted with twice its bulk of water, is most convenient; but whenever the carbonic acid gas is required in large quantities, the comparative cheapness of sulphuric acid will always give it the preference; and the clogging effect of the resulting sulphate of lime may be in a great measure obviated by the use of a proper agitator.

According to Berzelius, the cheapest method of obtaining the bicarbonate of potassa is to suspend a concentrated solution of the purified carbonate, contained in a stoneware dish, within a cask over a liquid undergoing the vinous fermentation. The alkali is thus surrounded by an atmosphere of carbonic acid, and by absorbing it, becomes bicarbonate in the course of five or six weeks, and crystallizes. The distillers particularly are enabled with great facility to prepare this salt by suspending the alkaline solution, over the wort, in the fermenting tun. The salt in powder called *sal æratus*, which is made in the New England States and perhaps elsewhere, is, we believe, prepared in this way. It is, however, not a perfect bicarbonate.

Properties, &c. Bicarbonate of potassa is in the form of white inodorous crystals, permanent in the air, and having the shape of flat irregular eight-sided prisms with two-sided summits. It has a slightly alkaline taste, and acts but feebly on vegetable colours. It dissolves in four times its weight of cold water, and in five-sixths of its weight of boiling water, by which it is partially converted into sesquicarbonate. It is very sparingly soluble in alcohol. Exposed to a low red heat, it loses half its carbonic acid, and returns to the state of carbonate, which, when thus obtained, is free from silica, and otherwise very pure. Dissolved in nitric acid, it should give a clear solution, the transparency of which is not disturbed by nitrate of silver, or carbonate of soda. When perfectly saturated, its solution does not precipitate a solution of sulphate of magnesia. With this exception, its incompatibles are nearly the same as those of the carbonate; but calomel is not decomposed by it; and it produces a white precipitate with corrosive sublimate, instead of the brick-red one caused by the regular carbonate. It consists of two equiv. of carbonic acid 44.24, one of potassa 47.15, and one of water 9=100.39. It is, therefore, properly a *bicarbonate*, not a *carbonate* as it is called by the London and Edinburgh Colleges. By an unfortunate confusion in nomenclature, the name "carbonate of potassa" is used in two senses in the different Pharmacopœias; and as this circumstance may cause some perplexity, we subjoin the following tabular statement, which shows at one view the exact import of the different officinal names.

Nature.	*U.S. and Dublin.*	*London.*	*Edinburgh.*
Ordinary carbonate.	Potassæ Carbonas.	Potassæ Subcarbonas.	Sub-Carbonas Potassæ.
Saturated carbonate.	Potassæ Bicarbonas.	Potassæ Carbonas.	Carbonas Potassæ.

Thus it is perceived that the term "carbonate of potassa" means the *ordinary carbonate* when used in the U.S. and Dublin Pharmacopœias, and the *saturated carbonate*, when employed by the London and Edinburgh Colleges.

The medical properties of this salt are the same as those of the carbonate, to which it is preferable on account of its milder taste, and greater acceptability to the stomach. The dose is from twenty grains to a drachm. B.

AQUA SUPER-CARBONATIS POTASSÆ. *Ed. Water of Super-Carbonate of Potassa.*

"Take of Water *ten pounds;* Purest Sub-Carbonate of Potassa [salt of tartar] *an ounce.* Dissolve, and expose the solution to a stream of Carbonic Acid gas, arising from Carbonate of Lime, in powder, Sulphuric Acid, each, *three ounces*, Water *three pounds*, gradually and cautiously mixed.

"The chemical apparatus invented by Dr. Nooth is well adapted for this preparation. But if a larger quantity of the liquor is required, an apparatus must be used capable of producing sufficient pressure. The solution should be kept in well stopped bottles." *Ed.*

This preparation may be considered as a bicarbonate of potassa dissolved in carbonic acid water; for from the great excess of carbonic acid present, the alkali probably passes into the state of bicarbonate. It is, however, altogether superfluous, in consequence of the general introduction into the shops of carbonic acid water (artificial Seltzer water), which may be readily employed for dissolving any desired proportion of the alkaline carbonate here employed, with the result of forming a much brisker preparation. This solution has the general sparkling qualities and acidulous taste of carbonic acid water; the alkaline taste of the carbonate being covered in a great measure by the large excess of carbonic acid. It is intended merely to furnish a grateful form for the administration of the carbonate of potassa. (See *Aqua Acidi Carbonici.*) B.

POTASSÆ NITRAS PURIFICATUM. *Dub. Purified Nitrate of Potassa.*

"Take of Nitrate of Potassa *one part.* Dissolve it in *two parts* of boiling Water, filter the solution, and set it aside, so that on cooling crystals may form." *Dub.*

The purified nitre of commerce is sufficiently pure for medicinal purposes; so that this formula of the Dublin College is entirely unnecessary. The properties of nitre, and the manner in which it is purified, have been fully explained under another head. (See *Potassæ Nitras.*)

Off. Prep. Æther Nitrosus, *Dub.* B.

SULPHAS POTASSÆ CUM SULPHURE. *Ed.* *Sulphate of Potassa with Sulphur.*

"Take of Nitrate of Potassa, in powder, and of Sublimed Sulphur, *equal weights.* Mix them well together, and inject the mixture, by small portions at a time, into a red-hot crucible. When the deflagration is over, allow the salt to cool, and place it in a glass vessel well stopped." *Ed.*

When the mixture, indicated in this formula, is thrown into a red-hot crucible, each successive portion melts, and the sulphur floats on the surface of the nitre with an appearance like a brown oil, burns vividly, and gives rise to a copious evolution of sulphurous acid gas. The product of the deflagration is a white friable mass, intermixed apparently with undecomposed sulphur.

The nature of this preparation has not been determined. On the supposition that it is a sulphate of potassa, mixed with a certain portion of sulphur, as the Edinburgh name implies, its formation may be thus explained. By the combined influence of the sulphur, and of the heat employed, the nitric acid of the nitre is totally decomposed, and is thus enabled to furnish sufficient oxygen to convert a portion of the sulphur into sulphuric acid, which, as soon as formed, combines with the base of the nitre, to form the sulphate of potassa. This is left mixed with a portion of sulphur, which has escaped combustion; but the greater part of the latter undergoes ordinary combustion, and is dissipated as sulphurous acid fumes.

Supposing the saline matter to be a sulphate containing a little free sulphur, this combustible is evidently used in great excess; but whether this excess is necessary to obtain the exact preparation desired by the Edinburgh College, it is not easy to determine. The late Dr. Duncan ascertained that the product amounted only to four-tenths of the materials employed. It is, therefore, smaller than it ought to be, even supposing that the residue consisted of nothing but sulphate of potassa.

Dr. Duncan was of opinion that the preparation under consideration cannot be viewed as a sulphuretted sulphate, and for the following satisfactory reasons. In the first place, it is more soluble in water than sulphate of potassa, and forms a yellowish solution, the water leaving undissolved only a small residue of a black colour, which is not sulphur. In the second place, it exhales during solution a sulphureous smell, and its taste is sulphureous. These facts seem to show that a small portion of sulphite of potassa is present in the preparation, or, at least, some sulphurous acid in a state of loose combination.

Properties, &c. This salt has an acid and sulphureous taste, and an acid reaction with test paper. When pulverized, it yields a pale yellowish-white powder. It is soluble in eight times its weight of cold water. It is, however, not a uniform preparation; different specimens, apparently prepared with equal care, exhibiting some points of difference in properties. It was called by the earlier chemists *sal polychrestus Glaseri.* Its other properties coincide generally with those of sulphate of potassa, which may be considered as its basis.

Medical Properties and Uses. The medical effects of this preparation differ but little, if at all, from those of sulphate of potassa. Its action on the system is stated by Dr. Duncan to resemble that of the sulphureous mineral waters which contain a portion of neutral salt. The dose is from half a drachm to a drachm. B.

POTASSÆ BISULPHAS. *Dub.* POTASSÆ SUPERSULPHAS. *Lond.* *Bisulphate of Potassa. Supersulphate of Potassa.*

"Take of Commercial Sulphuric Acid *two parts;* Carbonate of Potassa from Pearlash *a sufficient quantity;* Water *six parts.* Mix one part of the Sulphuric Acid with the Water, and saturate the mixture with the Carbonate of Potassa; then add the other part of the Acid to the liquor and evaporate it, so that on cooling crystals may form." *Dub.*

"Take of the salt which remains after the distillation of Nitric Acid *two pounds;* Boiling Water *four pints.* Mix, that the salt may dissolve, and filter. Then boil down the solution to one-half, and set it aside that crystals may form. Pour off the liquid, and dry the crystals on bibulous paper." *Lond.*

The Dublin process for forming this supersalt is more precise than the London, but at the same time less economical. The object being to obtain a salt, containing twice as much sulphuric acid as exists in the neutral sulphate, it is plain that by dividing the acid employed into two equal parts, and saturating one of these parts with potassa, the resulting neutral sulphate must be converted into a bisulphate by the addition of the other part. In explaining the London formula, it is only necessary to recall to the reader's attention, a part of the explanations given under the head of *Nitric Acid.* It was there stated, that for the proper decomposition of nitre, for the purpose of obtaining nitric acid, it was necessary to use two equiv. of sulphuric acid to one of the salt. Consequently, the salt which remains after the distillation of nitric acid is really a bisulphate, and only requires to be dissolved, and the solution filtered and duly evaporated, in order that it may be freed from accidental impurities and brought to the state of crystals. The quantity of water ordered by the London College is excessive, and causes a waste of time and fuel to dissipate it by subsequent evaporation. Two pints of water instead of four, would probably form a solution of the proper medium strength, and this reduction would supersede the necessity of subsequent evaporation. If the solution is evaporated to a pellicle, the salt, on cooling, concretes into a mass; and if it be too dilute, the excess of acid remains in the water, and sulphate of potassa is obtained.

Properties, &c. Bisulphate of potassa is a white salt, usually presenting the form of minute prismatic crystals, and having an extremely acid taste. It is soluble in twice its weight of cold water, and in less than its weight of boiling water. Alcohol does not dissolve it, but when added to an aqueous solution, precipitates the neutral sulphate. Exposed to the air, it effloresces slightly on the surface, and when moderately heated, it readily melts, and runs like oil. At a red heat, it loses water and its excess of acid, and is reduced to the state of neutral sulphate. From its excess of acid, it acts precisely as an acid on the carbonates, causing them to effervesce. It is incompatible with alkalies, earths, and their carbonates, and with many of the metals and most oxides. This salt was formerly called *sal enixum.* It consists of two equiv. of sulphuric acid 80.2, one of potassa 47.15, and two of water 18=145.35. The name of the Dublin College is, therefore, most precise.

Medical Properties and Uses. The bisulphate of potassa unites aperient properties with those of sulphuric acid, and may be given in cases of constipation with languid appetite, such as very often occurs in convalescence from acute diseases. Dr. Paris states that it forms a grateful adjunct to rhubarb. It answers, also, according to Dr. Barker, for preparing an aperient effervescing draught at little expense. Equal weights, a drachm for instance, of the bisulphate of potassa and carbonate of soda, may be dissolved separately, each in two fluidounces of water, then mixed, and taken in the state of effervescence. The dose of the bisulphate is one or two drachms. B.

POTASSÆ SULPHURETUM. *U.S., Lond., Dub.* SULPHURETUM POTASSÆ. *Ed.* *Sulphuret of Potassa.*

"Take of Sulphur *an ounce;* Carbonate of Potassa *two ounces.* Rub the Carbonate of Potassa, previously dried, with the Sulphur; melt the mixture, in a covered crucible, over the fire; then pour it out, and when cold, put it into a bottle, which is to be well stopped." *U.S.*

"Take of Washed Sulphur *an ounce;* Subcarbonate of Potassa *two ounces.* Rub them together, and place the mixture over the fire, in a covered crucible, until they unite." *Lond.*

"Take of Sub-Carbonate of Potassa *two parts;* Sublimed Sulphur *one part.* Rub them together, and put them into a large coated crucible, and having fitted on the cover, surround it cautiously with live coals, so that at length the mixture shall melt. Keep the mass in a very close phial." *Ed.*

"Take of Carbonate of Potassa *four parts;* Sublimed Sulphur *one part.* Having previously mixed them, put them in a crucible, fit a cover to it, and expose them to a heat gradually raised until they unite. Keep the Sulphuret in a well stopped bottle." *Dub.*

When carbonate of potassa is melted with an excess of sulphur, the carbonic acid is expelled. Three-fourths of the potassa are decomposed; its oxygen, by uniting with a part of the sulphur, generates sulphuric acid, which, by union with the undecomposed potassa, produces sulphate of potassa; while the potassium forms with the remaining sulphur a sulphuret of potassium, with more or less excess of sulphur. Thus the preparation under consideration, formerly called *hepar sulphuris* or *liver of sulphur*, is not a sulphuret of potassa, but a mixture of sulphate of potassa and sulphuret of potassium, with excess of sulphur. In the first three formulæ given above, the sulphur is melted with twice its weight of the carbonate; in the Dublin formula, with four times its weight. Berzelius says that the true *hepar* is formed by melting 100 parts of the carbonate with at least 94 of sulphur, and that the sulphuret of potassium formed contains five equiv. of sulphur to one of metal. These proportions give a great excess of sulphur, compared with those adopted in the Pharmacopœias. The ratio of the sulphur is smallest in the Dublin Pharmacopœia, in which it has been reduced to one-fourth the quantity directed in the edition of 1807. This proportion is evidently too small, and yet we are assured by Dr. Barker, that the present Dublin mode of preparing this compound is much preferable to the old one. Upon the whole, however, it seems probable that the proportion adopted by the other Pharmacopœias is most eligible; and we are the more inclined to this opinion, as it is recommended by M. Henry of Paris. The use of a large crucible, as directed by the Edinburgh College, is proper; as otherwise the extrication of the carbonic acid is apt to cause the fused mass to swell up so as to overflow. When the fusion is completed, the mass should be poured out on a marble slab, and as soon as it concretes, should be broken into pieces, and immediately transferred to a well stopped bottle.

The different Pharmacopœias use the carbonate of potassa from pearlash; but this is considered by some authorities as not sufficiently pure. In the process of M. Henry, which is stated to be the best that has yet been devised, the purest carbonate of potassa is employed. His formula is as follows. Mix two parts of real salt of tartar with one of roll sulphur reduced to powder, and put the mixture into flat-bottomed matrasses, which should be only two-thirds filled by it. These are placed on a sand-bath, at equal distances, and the fire is applied, so as, at first, to produce only a gentle heat, which is afterwards increased. Care must be taken that the necks of the matrasses do not become obstructed. The heat is continued, until the matter is brought to the state of tranquil fusion, when it is allowed to cool. The mass obtained is compact, smooth, and of a fine yellow colour, and is broken into pieces and preserved in close bottles.

Properties, &c. Sulphuret of potassa, when properly prepared, is a hard and brittle substance, having a nauseous, alkaline, and bitter taste. Its colour is liver-brown, and hence its former name of *hepar sulphuris.* It is inodorous when dry, but emits a slightly fetid smell when moist, owing to the extrication of a small portion of hydrosulphuric acid gas. It is completely soluble in water, forming a liquid of a deep orange colour. During its solution, the sulphuret of potassium, by means of the elements of water, becomes changed into hydrosulphate of potassa. By exposure to the air it attracts moisture, and the same change takes place more slowly. The solution is decomposed by the mineral acids, which combine with the potassa, extricate hydrosulphuric acid, and precipitate the excess of sulphur in the state of hydrate. It is also incompatible with the solutions of most of the metals, which are precipitated either as sulphurets or hydrosulphates. When this preparation is kept in bottles imperfectly stopped, it becomes white on the surface, in consequence of the oxidation of the elements of the sulphuret of potassium, which is thereby converted into sulphate of potassa. B.

Medical Properties and Uses. The sulphuret of potassa is said to be diaphoretic. It acts, moreover, as an antacid, and produces the general effects of sulphur upon the system. By some it is maintained to be sedative, and directly to reduce the action of the heart. The complaints in which it has been most advantageously employed are chronic rheumatism and gout, and various cutaneous affections. It has been given with less benefit in painters' colic, asthma, and chronic catarrh, and acquired a short-lived reputation as a remedy in croup, after the publication of the essay to which the prize offered by Napoleon for the best dissertation on this disease was awarded. It is said, in some cases of cancer, to have assisted the palliative operation of hemlock. In consequence of its property of forming insoluble sulphurets when mixed with the metallic salts, it has been proposed as an antidote for some of the mineral poisons, such as corrosive sublimate, arsenious acid, the salts of copper, and the preparations of lead. Orfila, however, has proved that it does not prevent the effects of these poisons, but on the contrary is itself highly poisonous when given in large doses. According to this author, it occasions death by corroding the stomach, and depressing the powers of the nervous system. Dissolved in water it has proved very efficacious as an external application in cutaneous diseases, and in scabies is an almost certain remedy. It may be used for this purpose in the form of lotion, bath, or ointment. For a lotion it may be dissolved in water in the proportion of from fifteen to thirty grains to the fluidounce, and for a bath, the same quantity or rather more may be added to a gallon of water. A very small proportion of muriatic or sulphuric acid may in either case be added to the solution.

The dose of the sulphuret of potassa is from two to ten grains, repeated several times a day, and given in pill with liquorice, or in solution with syrup. In infantile cases of croup, from one to four grains were given every three or four hours. W.

POTASSÆ SULPHURETI AQUA. *Dub.* *Water of Sulphuret of Potassa.*

"Take of Washed Sulphur *one part;* Water of Caustic Potassa *eleven parts.* Boil for ten minutes, and filter through paper. Keep the liquor in well stopped bottles. The specific gravity of this solution is 1.117." *Dub.*

When sulphur is boiled with a solution of caustic potassa, a part of the water is decomposed, and its elements, by uniting to separate portions of sulphur, give rise to hyposulphurous and hydrosulphuric acids, which, by combining with the alkali, form a hyposulphite and hydrosulphate of potassa in solution. Accordingly, this preparation is not a solution of sulphuret of potassa, as it is called by the Dublin College; neither is it identical with an aqueous solution of the preceding preparation, though its name would naturally lead to that supposition.

Properties, &c. This liquid has an unctuous feel and a deep orange colour. It is decomposed by acids, which cause an effervescence of hydrosulphuric acid,and a milky appearance from the precipitation of sulphur. Upon exposure to the air it is gradually converted into a solution of the sulphate of potassa. It has the same medical properties as the last preparation; and is used internally and externally for the most part in cutaneous eruptions. The dose is from ten minims to a fluidrachm, diluted with water, and given two or three times a day. When used as a bath it imparts an orange colour to the skin. B.

POTASSÆ TARTRAS. *U.S., Lond., Dub.* TARTRAS POTASSÆ, *Ed. Tartrate of Potassa. Soluble Tartar.*

"Take of Carbonate of Potassa *sixteen ounces;* Supertartrate of Potassa [cream of tartar] in powder, *three pounds;* Boiling Water *a gallon.* Dissolve the Carbonate of Potassa in the Water; then gradually add the Supertartrate of Potassa, until effervescence ceases. Filter the solution through paper; then evaporate it till a pellicle forms, and set it aside to crystallize. Pour off the water, and dry the crystals upon bibulous paper." *U. S.*

The *London* formula is essentially the same with the above, which was copied from it with some slight changes in phraseology.

"Take of Sub-Carbonate of Potassa *one part;* Super-Tartrate of Potassa *three parts,* or *a sufficient quantity;* boiling Water *fifteen parts.* Dissolve the Sub-Carbonate in Water, and gradually add to the solution the Super-Tartrate of Potassa in fine powder, so long as it excites effervescence, which generally ceases before three times the weight of the Sub-Carbonate has been added; then filter the solution when cold through paper, and after due evaporation set it aside to crystallize." *Ed.*

"Take of Carbonate of Potassa from Pearlash *five parts;* Bitartrate of Potassa [cream of tartar] *fourteen parts;* boiling Water *forty-five parts.* Add the Bitartrate of Potassa, in very fine powder, to the Carbonate of Potassa, dissolved in the Water. Filter the solution through paper, and evaporate it, so that on cooling crystals may form." *Dub.*

In these processes, the excess of acid in the supertartrate is saturated by the potassa of the carbonate, the carbonic acid is extricated with effervescence, and the neutral tartrate of potassa is obtained. On account of the greater solubility of the carbonate than the supertartrate, the former is taken in a stated quantity and dissolved, and the latter is added to the solution formed to full saturation. As the salts are mixed in this order, the case may be considered as one in which a definite portion of carbonate of potassa in solution is saturated by the excess of acid of the supertartrate; and this manner of viewing the reaction comes to the same thing. As the cream of tartar is sucessively added, the mutual action of the salts should be promoted by constant stirring; and the addition should be continued so long as effervescence takes place, which is a better mode of proceeding than to add any specified quantity of the supersalt; since, from its variable quality, it is impossible to adjust precisely the proportion applicable to all cases. It is necessary that the solution should be exactly neutral, or a little alkaline; and hence, if inadvertently too much cream of tartar is added, the proper state may be restored by adding a little of the alkaline carbonate. When the saturation has been completed, the solution is filtered to separate the tartrate of lime, which appears in white flocks, and which is always present in cream of tartar as an impurity. The evaporated liquor should then be placed in *warm* earthenware vessels, to ensure a slow refrigeration; and after remaining at rest for several days, the crystals begin to form. In order that the crystallization should proceed favourably, it is necessary, according to Baumé, that the solution should be somewhat alkaline. Iron vessels should not be used in any part of the process; as this metal is apt to discolour the salt.

The proportions of the carbonate to the supertartrate taken in the different formulæ, are somewhat different. In the U. S. and London process, the salts are to each other as 5 to 11.25; in the Edinburgh, as 5 to 15, and in the Dublin as 5 to 14. The equivalent quantities coincide most nearly with the proportions of the Dublin College.

Tartrate of potassa is sometimes made in the process for preparing tartaric acid. When thus obtained, the excess of acid in the supertartrate is neutralized by means of carbonate of lime; which generates an insoluble tartrate of lime, and leaves the neutral tartrate in solution, from which it may be obtained by evaporation and crystallization. (See *Acidum Tartaricum.*)

Properties, &c. Tartrate of potassa, prepared according to the officinal processes, is in the form of white crystals, which are slightly deliquescent, and usually have the shape of irregular six-sided prisms with dihedral summits. Its taste is cooling and bitterish. It dissolves in its weight of cold water, and in much less boiling water, and is soluble in 240 parts of boiling alcohol. Exposed to heat, it undergoes fusion, swells up, blackens, and is decomposed; being converted into carbonate of potassa. For medicinal use, it should always be crystallized; but as it ordinarily occurs in the shops, it it is in a white granular powder, obtained by evaporating the solution to dryness, while it is constantly stirred. In this state it is said to require four times its weight of water for solution. It is never purposely adulterated, but if it be obtained by evaporation to dryness, it is liable to contain an excess either of carbonate or of supertartrate of potassa, when it will have an alkaline or acid reaction. It is decomposed by all the strong acids, and many acidulous salts, which cause the precipitation of minute crystals of supertartrate of potassa, by abstracting one equiv. of alkali from two of the salt. It is composed of one equiv. of tartaric acid 66.48, and one of potassa 47.15=113.63. According to Berzelius, the crystals contain no water of crystallization.

Medical Properties and Uses. Tartrate of potassa is a mild cooling purgative, operating, like most of the neutral salts, without much pain, and producing watery stools. It is applicable to febrile diseases, and is occasionally combined with senna, the griping effects of which it has a tendency to obviate. The dose is from a drachm to an ounce, according to the degree of effect desired. B.

POTASSII IODIDUM. *U. S.* POTASSÆ HYDRIODAS. *Dub.* *Iodide of Potassium. Hydriodate of Potassa.*

"Take of Solution of Potassa *two pints*, Iodine *a sufficient quantity.* Apply a gentle heat to the Solution, and add by degrees sufficient Iodine to saturate the Potassa, and to impart a brown colour to the liquid. Then pass Hydrosulphuric Acid through the solution, in a proper vessel, till it loses its brown colour, and retains the odour of the Acid. Filter through paper, and having poured hot water upon the residue, again filter. Boil the filtered liquors for a short time that the Hydrosulphuric Acid may be driven off; then, if sulphur has been precipitated, remove it, and saturate any acid that may be present with the Solution of Potassa. Lastly, boil the liquor to dryness. Hydrosulphuric Acid is obtained from Sulphuret of Iron, by the addition of Sulphuric Acid diluted with four times its weight of water." *U. S.*

"Take of Iodine *one part;* Sulphuret of Iron, in coarse powder, *five parts;* Sulphuric Acid *seven parts;* Distilled Water *forty-eight parts;* Water of Carbonate of Potassa *a sufficient quantity;* Rectified Spirit *six parts.* Mix the Iodine by trituration with sixteen parts of the water, and put the mixture into a glass vessel. Pour the Acid, previously diluted with thirty-two parts of the Water, on the Sulphuret, contained in a matrass; and by means of a tube adapted to the neck of the matrass, and reaching to the bottom of the vessel containing the Iodine and Water, transmit the gas through the mixture, until the Iodine entirely disappears. Filter the liquor, and immediately evaporate it, by a superior heat, to one-eighth part, and again filter it. Then gradually add as much Water of Carbonate of Potassa, as will be sufficient to saturate the acid, which is known by the cessation of the effervescence. Then expose the mixture to heat, until the residual salt is dry and of a white colour. On this pour the Spirit, and dissolve by the aid of heat. Lastly, from the remaining salt, pour off the solution, evaporate it to dryness, and keep the residuum in a close vessel." *Dub.*

By these processes, hydriodate of potassa is obtained in solution, which by evaporation to dryness becomes iodide of potassium. The U.S. process is that recommended in 1825 by Dr. Turner of London. On adding iodine in slight excess to a warm solution of potassa, water is decomposed; and by its elements uniting with separate portions of iodine, iodic and hydriodic acids are generated, which by combining with the alkali, form severally the iodate and hydriodate of potassa in solution. In the next step of the process, the hydrosulphuric acid gas furnishes hydrogen to the elements of the iodic acid, and converts it into hydriodic acid and water, while the sulphur of the gas is precipitated, and is removed by filtration. The solution thus becomes one exclusively of hydriodate of potassa, and, upon being evaporated to dryness, yields iodide of potassium, in consequence of the hydriodate losing the elements of water. Should the solution at first contain an excess of iodine, the hydrosulphuric acid will convert this also into hydriodic acid, which would remain in excess; and hence the direction is given to saturate any superabundant acid with solution of potassa before evaporating to dryness.

The process which Berzelius recommends as the best, on account of its economy, resembles the one just described, and is as follows. Dissolve iodine in caustic potassa, until the liquid begins to be coloured. Then evaporate it sufficiently to cause the iodate to crystallize, and boil the mother water containing the hydriodate to dryness, so as to obtain the iodide of potassium, which must be fused, in order to convert any iodate of potassa present into iodide. Berzelius states, that the solution of the mixed iodic salts may be at once evaporated to dryness, and the dry mass fused, so as to obtain iodide of potassium, without first separating the iodate by crystallization; but that the process when thus conducted is liable to the objection, that, during the fusion, the mass bubbles up, and portions of it are thrown out of the vessel, giving rise to a loss.

In the Dublin process, a stream of hydrosulphuric acid gas being passed through water in which iodine is diffused, the gas becomes decomposed, its sulphur is precipitated, and its hydrogen, by combining with the iodine, generates hydriodic acid, which remains in solution. The sulphur being separated by filtration, and the solution duly concentrated, the acid is converted into hydriodate of potassa by saturating it with carbonate of potassa, the carbonic acid of which, by being extricated, causes the effervescence. By evaporation to dryness, the hydriodate in solution becomes the iodide of potassium. But lest it should be contaminated with iodate or carbonate of potassa, the dry mass is directed to be digested with a portion of rectified spirit (alcohol), which takes up the iodide of potassium, and leaves these salts behind. The alcoholic solution of the pure iodide is then evaporated to dryness, and is thus obtained in the solid state.

This process is not so eligible as that of the U.S. Pharmacopœia; as it requires the previous formation of hydriodic acid, and the use of alcohol. An easier process, according to Dr. Turner, than either of these, is to add iodine to the officinal sulphuret of potassa in solution, (which in this state may be considered as a hydrosulphate of potassa,) as long as sulphur is precipitated. The iodine, by its superior affinity, replaces the sulphur, and thus converts the hydrosulphate into the hydriodate of potassa. The chief objection to this process is that the product is contaminated with sulphate of potassa, an impurity always present in the officinal sulphuret.

The following process by MM. Baup and Caillot is stated by Chevallier to be generally followed in France, and to give a whiter product than any other. Introduce into a matrass or capsule 50 parts of distilled water and 10 of iodine, and add gradually 5 parts of bright iron filings. Heat the mixture gently, and stir it occasionally, until, from being of a deep brown colour, it becomes colourless, and then filter. By the reaction of the materials, a hydriodate of iron is formed in solution. This is then heated nearly to the boiling point, and accurately saturated by means of carbonate of potassa, the alkali of which forms a hydriodate in solution, and precipitates the oxide of iron. By a new filtration, separate the oxide of iron, and evaporate the filtered liquor to a pellicle in a porcelain capsule. By the cooling of the solution, crystals of iodide of potassium will be formed, which are to be washed with a little water, drained, and dried on bibulous paper with a gentle heat. The same salt may be obtained also, by a similar process to the above, merely substituting zinc for the iron.

Properties. Iodide of potassium is a deliquescent salt, of an opaque white colour, and acrid and slightly bitter taste. It generally crystallizes in cubes, but by careful evaporation may be obtained in pyramids. It is soluble in about two-thirds of its weight of cold water, and is converted in the act of dissolving into hydriodate of potassa. It dissolves freely also in alcohol, and when a hot saturated alcoholic solution is allowed to cool, it deposites the salt in crystals. Its aqueous solution is capable of taking up a large quantity of iodine, and becomes an ioduretted hydriodate of a deep brown colour. Exposed to heat, it fuses readily into a mass having a crystalline and pearly aspect, and at a red heat is volatilized without decomposition. This latter property furnishes the means of detecting any fixed impurity, and its solubility in alcohol renders easy the discovery of any foreign substance insoluble in that menstruum. The most usual impurities contained in this salt, are chloride of sodium, and iodate and carbonate of potassa. The latter salts may be detected by their insolubility in alcohol; and if upon distilling a small portion of the iodide with nitric acid, a liquid is obtained which is precipitated by nitrate of silver, it is proof of the presence of a chloride, which is probably chloride of sodium. Carbonate of potassa is sometimes fraudulently introduced; and the late Dr. Duncan made mention of a spurious iodide of potassium sold at one period in Scotland, which contained 64 per cent. of this carbonate. At present iodine is comparatively so cheap, that but little motive remains for the practice of these frauds.

Composition. Iodide of potassium consists of one equiv. of iodine 126.3, and one of potassium 39.15=165.45. It contains no water of crystallization, a circumstance which removes all ambiguity as to whether it is an iodide or hydriodate. The Dublin name of hydriodate of potassa is, therefore, erroneous as applied to the solid salt; and though it may be supposed to become a hydriodate by solution, the question here relates to a solid and not to a liquid.

Medical Properties and Uses. This salt exhibits the same medical properties as iodine, though in a less degree. The powers of iodine as a remedy, have been so fully detailed in another place, that we have very little to add here. (See *Iodinum.*) Dr Lugol considers it to be quite inferior to iodine as a therapeutical agent, and uses it, apparently, for no other purpose than to promote the solubility of iodine in water. It has, however, been preferred by some practitioners, for the purpose of producing the constitutional effects of iodine. Dr. Montgomery states it to have been used by Dr. De Renzy, of Ireland, with great success in hæmoptysis; and Dr. Graves, another Irish physician, employed it with success in a very obstinate erythematic swelling of the hand. The dose is from one to two grains, or from fifteen to thirty drops of a solution made by dissolving thirty-six grains of the salt in a fluidounce of distilled water. It is chiefly used as an external application in the form of ointment. (See *Unguentum Potassæ Hydriodatis.*)

Off. Prep. Unguentum Potassæ Hydryodatis, *Dub.* B.

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PULPARUM EXTRACTIO.

Extraction of Pulps.

"Boil unripe pulpy fruits, and ripe ones if dry, in a small quantity of water, until they become soft; then express the pulp through a hair sieve, and boil it down to the consistence of honey, in an earthen vessel, over a gentle fire, stirring it continually in order to prevent it from burning.

"The pulp of *Cassia fistularis* is, in like manner, to be boiled out from the bruised pod, and afterwards reduced to a proper consistence by evaporating the water.

"The pulps of fresh ripe fruits are to be expressed through the sieve, without previous boiling." *Ed.*

"Fruits of which the pulps are to be extracted, if unripe, or ripe and dry, are to be boiled in a little water until they become soft. Then the pulps, expressed through a hair sieve, are to be slowly evaporated to a proper consistence." *Dub.*

"Set *pulpy fruits*, if unripe, or ripe and dry, in a moist place to soften; then express the pulps through a hair sieve; afterwards boil them with a gentle fire, frequently stirring; lastly, evaporate the water by means of a water-bath, until the pulps become of a proper consistence.

"Pour boiling water upon the bruised *Cassia Pods*, so that the pulp may be washed out, and press this first through a coarse sieve, and afterwards through a hair sieve; then evaporate by means of a water-bath until the pulp acquires a proper consistence.

"Of fruits which are ripe and fresh, express the pulp or juice through a sieve, without boiling." *Lond.*

There are very few fruits the pulps of which are now employed in pharmacy. For these few the directions of the Edinburgh and Dublin Colleges are greatly preferable to those of the London, which are indeed impracticable, as dried fruits often do not become sufficiently moist, by mere exposure in a damp place, to admit of the subsequent treatment ordered, and besides, would almost always become mouldy. W.

* * *

PULVERES.

Powders.

The form of powder is convenient for the exhibition of substances which are not given in very large doses, are not very disagreeable to the taste, have no corrosive property, and do not deliquesce rapidly on exposure. As the effect of pulverization is to expose a more extended surface to the action of the air, care should be taken to keep substances which are liable to be injured by such exposure, in closely stopped bottles. In many instances it is also important to exclude the light, which exercises a very deleterious influence over numerous medicinal agents when minutely divided. In relation to substances most liable to injury from these causes, the best plan is to powder them in small quantities and as they are wanted for use.

Powders may be divided into the *simple*, consisting of a single substance, and the *compound*, of two or more mixed together. The latter only are embraced under the present head. In the preparation of the compound powders, the ingredients, if of different degrees of cohesion or solidity, should be pulverized separately and then united. An exception, however, to this rule, is the employment of one substance to facilitate by its greater hardness the minute division of another, as in the *Powder of Ipecacuanha and Opium*. Deliquescent substances, and those containing fixed oil in large proportion, should not enter into the composition of powders, the former, because by absorbing moisture, they render the preparation damp and liable to spoil, the latter, because they are apt to become rancid, and impart an unpleasant odour and taste to the mixture.

The lighter powders may in general be administered suspended in water or other thin liquid; the heavier, such as those of metallic substances, require a more consistent vehicle, as syrup, molasses, honey, or some of the confections. Resinous powders, if given in water, require the intervention of mucilage or sugar.

The *Dublin College* gives the following general directions for the preparation of powders. "The substances to be powdered, having been previously dried, are to be beaten in an iron mortar. The powder is then to be separated by sifting it through a hair sieve, and is to be kept in close vessels." W.

PULVIS ALOES COMPOSITUS. *Lond., Dub. Compound Powder of Aloes.*

"Take of Extract of the Spiked Aloe [Socotrine aloes] *an ounce and a half;* Guaiac *an ounce;* Compound Powder of Cinnamon *half an ounce.* Rub the Aloes and the Guaiac, separately, into powder; then mix them with the Compound Powder of Cinnamon." *Lond.*

The *Dublin College* gives the same directions, substituting the hepatic for the Socotrine aloes, and their own aromatic powder for the compound powder of cinnamon of the London College.

The tendency of pulverized guaiac to concrete, and the excessively bitter taste of aloes, which is but imperfectly concealed by the aromatic addition, render the form of powder ineligible for the exhibition of these medicines. The preparation is a warm stimulant cathartic, but is little used. The dose is from fifteen to thirty grains. W.

PULVIS ALOES ET CANELLÆ. *U.S.* PULVIS ALOES CUM CANELLA. *Dub.* *Powder of Aloes and Canella.*

"Take of Aloes [hepatic, *Dub.*] *a pound;* Canella *three ounces.* Rub them separately into very fine powder [into powder, *Dub.*] and then mix them." *U.S., Dub.*

This preparation has long been known under the name of *hiera picra.* The canella serves to correct the griping property, and imperfectly to cover the taste of the aloes; but the unpleasant bitterness of the latter is still very obvious in the mixture, which would be better given in the form of pill than of powder. It is a popular remedy in amenorrhœa, and may be used for all the purposes to which aloes is applied. It is sometimes administered, in domestic practice, infused in wine or spirit. The dose is from ten to twenty grains. W.

PULVIS ALUMINIS COMPOSITUS. *Ed.* *Compound Powder of Alum.*

"Take of Alum *four parts;* Kino *one part.* Rub them together to a fine powder." *Ed.*

A solution of alum is decomposed by a solution of kino, and it is probable that the same effect takes place when the two substances, mixed in the state of powder, are introduced into the stomach: but whether their astringency is materially affected by the change is uncertain. The preparation may be employed in diarrhœa and menorrhagia, and externally to suppress hemorrhage, or as an astringent application to flabby indolent ulcers. The dose is from five to twenty grains. W.

PULVIS AROMATICUS. *U.S., Ed., Dub.* PULVIS CINNAMOMI COMPOSITUS. *Lond.* *Aromatic Powder.*

"Take of Cinnamon, Cardamom, Ginger, each, *two ounces.* Rub them together into a very fine powder." *U.S.*

The *Edinburgh* process corresponds with that of the U. S. Pharmacopœia. The *London College* directs two ounces of cinnamon, an ounce and a half of cardamom, an ounce of ginger, and half an ounce of long pepper; the *Dublin College*, two ounces of cinnamon, an ounce of cardamom seeds freed from their capsules, an ounce of ginger, and a drachm of long pepper.

The cardamom seeds should always, as directed by the Dublin College, be separated from their capsules; and the powder, when prepared, should be kept in well stopped bottles. The London and Dublin preparations are more pungent than that of the U. S. Pharmacopœia, in consequence of the long pepper which they contain. These powders are stimulant and carminative, and may be given in the dose of from ten to thirty grains, in cases of enfeebled digestion accompanied with flatulence; but they are chiefly used as corrigents and adjuvants of other medicines.

Off. Prep. Pulvis Aloës Comp., *Lond., Dub.;* Confectio Aromatica, *U. S., Ed.;* Confectio Opii, *U. S., Ed.* W.

PULVIS ASARI COMPOSITUS. *Ed., Dub.* *Compound Powder of Asarabacca.*

"Take of Leaves of Asarabacca *three parts;* Leaves of Marjoram, Lavender Flowers, each, *one part.* Rub them together into powder." *Ed.*

"Take of dried Leaves of Asarabacca *an ounce;* dried Lavender Flowers *a drachm.* Rub them together to powder." *Dub.*

This is an agreeable and efficacious errhine, useful in some cases of obstinate headach, toothach, and chronic ophthalmia. Five or six grains snuffed up the nostrils at bedtime, excite sneezing and a copious discharge of mucus, which continues to flow on the following day. W.

PULVIS CONTRAJERVÆ COMPOSITUS. *Lond. Compound Powder of Contrayerva.*

"Take of Contrayerva Root, in powder, *five ounces;* Prepared Oyster-shell *a pound and a half.* Mix them." *Lond.*

This powder unites the gently stimulant and diaphoretic properties of the contrayerva with the antacid properties of the oyster-shell; but the preparation is quite obsolete. W.

PULVIS CRETÆ COMPOSITUS. *Lond., Dub.* PULVIS CARBONATIS CALCIS COMPOSITUS. *Ed. Compound Powder of Chalk.*

"Take of Prepared Chalk *half a pound;* Cinnamon Bark *four ounces;* Tormentil Root, Gum Arabic, each, *three ounces;* Long Pepper *half an ounce.* Rub them separately into very fine powder, and then mix them." *Lond., Dub.*

"Take of Prepared Carbonate of Lime *four ounces;* Nutmeg *half a drachm;* Cinnamon Bark *a drachm and a half.* Rub them together to powder." *Ed.*

In the Edinburgh preparation, the aromatics are in too small a quantity to serve any other purpose than to communicate a pleasant flavour to the carbonate of lime, which is the only active ingredient. The powder of the London and Dublin Colleges is, on the contrary, warm, stimulant, and astringent, as well as antacid; and is well calculated for the treatment of diarrhœa, connected with acidity and unattended with inflammatory symptoms. In such a combination, however, the proper proportion, and even the choice of the ingredients, varies so much with the symptoms of the case, that they might with propriety be left to extemporaneous prescription. The dose of the compound powder of chalk is from ten to twenty grains, given in mucilage or sweetened water, and frequently repeated.

Off. Prep. Pulvis Cretæ Compositus cum Opio, *Lond., Dub.* W.

PULVIS CRETÆ COMPOSITUS CUM OPIO. *Lond., Dub. Compound Powder of Chalk with Opium.*

"Take of Compound Powder of Chalk *six ounces and a half;* Hard Opium, in powder, *four scruples.* Mix them." *Lond., Dub.*

The addition of the opium greatly increases the efficacy of the compound powder of chalk in diarrhœa; and its equal diffusion through the powder presents this advantage, that it may be conveniently given in minute doses applicable to infantile cases. Two scruples of the powder contain a grain of opium. In the diarrhœa of adults from ten to twenty grains may be given for a dose, and repeated several times a day, or after each evacuation. W.

PULVIS IPECACUANHÆ ET OPII. *U.S., Ed.* PULVIS IPECACUANHÆ COMPOSITUS. *Lond., Dub. Powder of Ipecacuanha and Opium. Dover's Powder.*

"Take of Ipecacuanha, in powder, Opium, in powder, each, *a drachm;* Sulphate of Potassa *an ounce.* Rub them together into a very fine powder." *U.S.*

All the British Colleges employ the same ingredients as above, and in the same proportions. The *London College*, having ordered them in the state of powder, simply directs them to be mixed together. The *Edinburgh* directions agree with those of our own Pharmacopœia, except that the opium is not pulverized before being rubbed with the other ingredients. The *Dublin College* first rubs the opium and sulphate of potassa together into powder, and then mixes the pulverized ipecacuanha with them.

The sulphate of potassa in this preparation serves, by the hardness of its particles, to promote that minute division and consequent thorough intermixture of the opium and ipecacuanha, upon which the peculiar virtues of the compound depend. It also serves to dilute the active ingredients and thus allow of their division into minute doses adapted to the complaints of children. This composition, though usually called Dover's powder, does not precisely correspond with that originally recommended by Dr. Dover, which is prepared as follows. Four ounces of nitrate of potassa and the same quantity of sulphate of potassa, are mixed together in a red-hot crucible, and afterwards very finely powdered; one ounce of opium, sliced, is then added, and ground to powder with the saline mixture; lastly, an ounce of ipecacuanha and an ounce of liquorice root, in powder, are mixed with the other ingredients. This process has been adopted in the Paris Codex.

The powder of ipecacuanha and opium is an admirable anodyne diaphoretic, not surpassed, perhaps, by any other combination in its power of promoting the cutaneous secretion. Opium itself has a strong tendency to the skin, evinced both by the occasional diaphoresis and by the itching and tingling sensation which it excites. While the vessels of the skin are stimulated by this ingredient of the powder, the secreting orifices are relaxed by the ipecacuanha, and the combined effect is much greater than that which results from either separately. At the same time the general stimulating influence of the opium, and its tendency to operate injuriously on the brain, are counteracted; so that the mixture may be given with safety in cases which might not admit of the use of opium alone. The preparation is applicable to all cases, not attended with much fever, or cerebral disease, or sick stomach, in which there is an indication for profuse diaphoresis, especially in painful affections, or those connected with unhealthy discharges. It is admirably adapted to the treatment of the phlegmasiæ, particularly rheumatism and pneumonia, when complicated with a typhoid tendency, or after a sufficient reduction of arterial excitement by the lancet or other mode of depletion. Under similar circumstances it is useful in dysentery, diarrhœa, and the various hemorrhages, especially that from the uterus. It is sometimes also given in dropsy. In the bowel affections, and whenever the hepatic secretion is deranged, it is frequently combined with small doses of calomel.

Ten grains of the powder contain one grain of opium. The dose is from five to fifteen grains, given diffused in water, or mixed with syrup, or in the form of bolus, and repeated at intervals of four, six, or eight hours, when it is desirable to maintain a continued diaphoresis. Its action may be materially promoted by warm drinks, such as lemonade, or balm tea, which, however, should not be given immediately after the powder, as they might provoke vomiting. W.

PULVIS JALAPÆ COMPOSITUS. *Ed., Dub.* *Compound Powder of Jalap.*

"Take of Jalap Root, in powder, *one part* [*half a pound*, Dub.]; Supertartrate of potassa *two parts* [*a pound*, Dub.]. Rub them together to a very fine powder." *Ed., Dub.*

The supertartrate, by being rubbed with the jalap, is thought to favour its more minute division, while it increases its hydragogue effect. A combination of these two ingredients, though with a larger proportion of cream of tartar, (see *Jalapa*,) is much used in this country as a cathartic in dropsy and scrofulous affections of the joints and glands. The dose of the officinal powder is from thirty grains to a drachm. W.

PULVIS KINO COMPOSITUS. *Lond., Dub.* *Compound Powder of Kino.*

"Take of Kino *fifteen drachms;* Cinnamon Bark *half an ounce;* Hard Opium *a drachm.* Rub them separately to very fine powder, and then mix them." *Lond., Dub.*

This is an anodyne astringent powder, useful in some forms of diarrhœa, but of which the composition would be better left to extemporaneous prescription, as the proportion of the ingredients should vary with the circumstances of the case. Twenty grains contain one grain of opium. The dose is from five grains to a scruple. W.

PULVIS OPIATUS. *Ed.* PULVIS CORNU USTI CUM OPIO. *Lond.* *Opiate Powder.*

"Take of Opium *one part;* Prepared Carbonate of Lime *nine parts.* Rub them together to a fine powder." *Ed.*

"Take of Hard Opium, in powder, *a drachm;* Hartshorn, burnt and prepared, *an ounce;* Cochineal, in powder, *a drachm.* Mix them." *Lond.*

These powders are intended to afford the means of exhibiting opium in minute doses; and it is of little consequence whether the carbonate or phosphate of lime is employed, although the antacid property of the former may in some instances prove advantageous. The cochineal of the London preparation merely serves to give it colour. Ten grains of the powder contain one grain of opium. W.

PULVIS PRO CATAPLASMATE. *Dub.* *Powder for a Cataplasm.*

"Take of Flaxseed which remains after the expression of the oil *one part;* Oatmeal *two parts.* Mix them." *Dub.*

This is a good material for the formation of poultices; but hardly deserves a place among the officinal preparations. The unpressed flaxseed meal is preferable to that which has been pressed, as the oil which it contains causes it to retain longer a soft consistence. W.

PULVIS SALINUS COMPOSITUS. *Ed., Dub.* *Compound Saline Powder.*

"Take of Muriate of Soda, Sulphate of Magnesia, each, *four parts;* Sulphate of Potassa *three parts.* Dry the salts with a gentle heat; then, having rubbed them separately to fine powder, mix them together, and keep the mixture in a well stopped bottle." *Ed., Dub.*

This is an aperient powder, and may be taken with advantage in costive habits, in the dose of two or three drachms, dissolved in half a pint of water or carbonic acid water, before breakfast. W.

PULVIS SCAMMONII COMPOSITUS. *Ed., Dub.* PULVIS SCAMMONEÆ COMPOSITUS. *Lond.* *Compound Powder of Scammony.*

"Take of Scammony, Hard Extract of Jalap, each, *two ounces;* Ginger Root *half an ounce.* Rub them separately to a very fine powder; and then mix them." *Lond., Dub.*

"Take of Scammony, Supertartrate of Potassa *equal parts.* Rub them together to a very fine powder." *Ed.*

It should be observed, that the compound of the Edinburgh College is essentially different from that of the London and Dublin Colleges; but we do not think that either of them is an eligible preparation. The cream of tartar in the former can serve little other purpose than to assist in the pulverization of the scammony, which does not require any peculiar care in this respect. In the latter, though the ginger may tend to correct the griping property of the purgative ingredients, the extract of jalap too closely resembles the scammony in its mode of operation to exert any important modifying influence upon it. The dose of the London powder is from seven to fifteen grains, of the Edinburgh, from ten to twenty grains. W.

PULVIS SENNÆ COMPOSITUS, *Lond.* *Compound Powder of Senna.*

"Take of Senna Leaves, Supertartrate of Potassa, each, *two ounces;* Scammony *half an ounce;* Ginger Root *two drachms.* Rub the Scammony separately, and the other ingredients together, to a very fine powder, and then mix them." *Lond.*

The cream of tartar in this preparation qualifies the action of the senna, while the scammony gives increased activity to the mixture, the dose of which would otherwise be too large for convenient administration. The ginger is added to prevent nausea and griping. The powder acts as a hydragogue cathartic in a dose varying from a scruple to a drachm. W.

PULVIS TRAGACANTHÆ COMPOSITUS. *Lond.* *Compound Powder of Tragacanth.*

"Take of Tragacanth, in powder, Gum Arabic, in powder, Starch, each, *an ounce and a half;* Refined Sugar *three ounces.* Rub the Starch and Sugar together to powder, then add the Tragacanth and Gum Arabic, and mix them all." *Lond.*

This is applicable to the general purposes of the demulcents; but is chiefly employed in Great Britain as a vehicle for heavy, insoluble powders. The dose is from thirty grains to a drachm, mixed with water or other mild liquid. W.

QUINIA.

Preparations of Quinia.

QUINIÆ SULPHAS. *U.S.* QUINIÆ SULPHAS. *Dub.* *Sulphate of Quinia.*

"Take of Yellow Bark, in powder, *a pound;* Lime, in powder, *four ounces;* Sulphuric Acid, Alcohol, Animal Charcoal, Distilled Water, each, *a sufficient quantity.* Boil the Bark for half an hour with eight pints of the Distilled Water, acidulated with a fluidounce of the Sulphuric Acid. Strain the decoction through linen; then boil the residue with the same quantity of acidulated Water, and filter as before. Mix the filtered liquors, and gradually add the Lime, stirring constantly. Wash the precipitate with Distilled Water, and having dried it, digest it in Alcohol with a moderate heat. Pour off the tincture, and repeat the digestion several times, till the Alcohol is no longer rendered bitter. Mix the tinctures and distil over the alcohol, till a brown viscid liquid remains in the retort. Upon this substance, removed from the retort, pour as much Sulphuric Acid, largely diluted with water, as may be sufficient for its perfect saturation. Then add the Animal Charcoal, and having evaporated the liquor sufficiently, filter it while hot, and set it aside to crystallize." *U.S.*

The process of the *Dublin College* is essentially the same with the above, though different in its details. Both were taken from the process of M. Henry Jun., of Paris, for which he received a prize from the French Academy of Sciences, and which, with some slight modifications, is now almost universally practised. This we shall present to our readers in full detail, premising, however, such an explanation of the more general directions of the U. S. Pharmacopœia, as may enable the student to understand each step of the process.

The yellow bark (Calisaya, or royal yellow) is the variety selected, because this contains quinia in the largest proportion, and most free from admixture with cinchonia. The alkali exists in the bark combined with kinic acid, and probably also, with one or more of the colouring principles, as suggested by M. Henry. As in this latter state it is of difficult solubility, if it be not insoluble in water, the whole of the quinia cannot be extracted from the bark by means of that liquid alone. Berzelius, however, attributes the difficulty of exhausting the bark to the circumstance, that water converts the native neutral kinates into soluble superkinates which are dissolved, and insoluble subkinates which remain. By adding sulphuric acid to the water in such quantities as to be in excess in relation to the quinia, the whole of the alkali combines with the acid to form a very soluble supersulphate, in which state it exists, together with various impurities, in the decoctions procured by the first steps of the process. By the addition of lime to the filtered and mixed decoctions, the sulphate is decomposed, giving up its sulphuric acid to the lime, while the quinia is liberated, and being insoluble in water, is precipitated in connexion with the sulphate of lime, the water retaining most of the impurities. The precipitate having been washed in order to purify it from every thing soluble in water, the next step is to separate the quinia from the sulphate of lime. This is accomplished by the agency of alcohol, which dissolves the former, and leaves the latter untouched. The whole of the alkali having been abstracted, the alcoholic solution of quinia is then sufficiently concentrated by evaporation, and diluted sulphuric acid added in such proportion as to form a neutral sulphate, which crystallizes when the liquor cools after concentration. The use of the animal charcoal is to deprive the salt of the colouring matter, which obstinately adheres to it through every stage of the process; and the object of the filtering is to separate the charcoal after it has performed this office. For the operator it is necessary to be acquainted not only with the outlines and general principles of a process, but with all its details, as the neglect of some points of little apparent importance may materially interfere with his success. It is to supply the deficiency of the process of the Pharmacopœia in this respect, that we introduce the following, extracted from the Dictionnaire des Drogues.

Process of M. Henry. Take 2000 parts of yellow bark, in powder, and 15,000 parts of water acidulated with 128 parts of sulphuric acid of 66° Baumé* Put the powder into a copper vessel, add a little water, make a paste by means of a wooden spatula; then mix this paste with the remainder of the liquid, place the vessel over the fire, and carry the heat to the point of ebullition. At the expiration of an hour, allow the acid decoction to rest, then strain it through linen, treat the residue with a fresh quantity of acidulated water, and strain as before. This treatment is to be repeated till the bark is exhausted, which may be known by the liquid ceasing to acquire bitterness. Now mix together all the decoctions, and add sufficient lime mixed with water to saturate the acid contained in the liquor. The quinia and cinchonia, separated from their combination with the acid, are precipitated along with the sulphate of lime, and the excess of lime added. Collect this precipitate upon a linen cloth previously moistened, taking care to preserve the liquid which passes through, as it still contains a portion of alkaline matter. To prevent the injurious reaction of the lime, contained in this liquor, upon the quinia, acidulate it slightly with sulphuric acid; then evaporate it one-third, and decompose the sulphate of quinia by an excess of lime. The precipitate now produced, is to be united with the first, and both are to be washed with water, till this ceases to acquire colour or taste; the water is then to be allowed to drain off, and the precipitate afterwards to be dried by a gentle heat. When perfectly dry it is to be powdered, and digested in alcohol of 36° Baumé, which, after some time, is to be decanted, and fresh portions successively added till they cease to extract any thing from the precipitate. Mix the alcoholic liquors, allow them to stand that the undissolved matter may subside, decant the clear portion, filter the remainder, introduce the whole into the water-bath of a still, and draw off three-quarters of the alcohol by distillation. There remains in the boiler a substance having the appearance of a resinous matter mixed with a small quantity of turbid liquor, which has a bitter taste and an alkaline reaction. Decant this liquor, and add to it water acidulated with sulphuric acid, so as to saturate the alkaline matter, taking care that the acid be not in excess. Litmus paper may be used to ascertain the neutrality of the mixture. During this operation the liquid should be kept hot. When it is allowed to cool, the sulphate of quinia precipitates. This is to be expressed, and boiled with water and a small quantity of animal charcoal previously washed with muriatic acid. After a few minutes of ebullition, filter the liquid while hot, and set it aside to crystallize. Drain the crystals, and afterwards dry them between folds of filtering paper at a temperature of 90° or 100° F. From the mother waters decolorized by charcoal, a new crop of crystals may be derived. A small quantity of sulphate of quinia may also be obtained from the viscid matter remaining in the water-bath of the still. For this purpose, saturate the matter with dilute sulphuric acid, evaporate one-half, add animal charcoal and boil for a few minutes, and lastly, filter the boiling liquid. On cooling, it deposites crystals which are to be treated as before described. The mother waters contain sulphate of cinchonia, with a proportion of sulphate of quinia which has not crystallized. They may be applied to important practical purposes. (See *Quiniæ Sulphas Impurus.*)

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* Sufficiently near approximations are 4 troy pounds of bark, 24 pints of water, and 3 troy ounces of sulphuric acid.

The following modification of the above process has been proposed by M. Bernardet. In the distillation of the alcoholic solution, the whole of the alcohol is to be drawn off by means of a water-bath, and the viscid residue treated with about 100 parts of alcohol, which completely dissolves it. Three thousand parts of water heated in a water-bath and acidulated with sulphuric acid so as to tinge litmus paper of a deep red, are then to be added, and the liquor filtered. The filtered solution is next to be boiled with common animal charcoal, not previously washed with muriatic acid as in the former case, which removes the colour, and by the carbonate of lime which it contains, serves to neutralize the excess of sulphuric acid. To complete the process, it remains only to filter anew, and to evaporate sufficiently. The sulphate of quinia is thus obtained very pure and white.

Muriatic acid may be substituted in the process for the sulphuric.

Other processes have been proposed, and attempts have been made to extract the quinia without the use of alcohol; but none have been found to unite equally with that described, the important requisites of economy and convenience.

We have been informed by Mr. John Farr, of Philadelphia, who is largely concerned in the manufacture of sulphate of quinia, that the Calisaya bark employed by him, yields an average product of about two per cent. of the salt.

Sulphate of quinia may be obtained from any of the varieties of Peruvian bark by the above process; but should any other than the Calisaya bark be employed, a large proportion of sulphate of cinchonia will necessarily result from the operation, and, being much more soluble than the sulphate of quinia will remain dissolved in the residuary liquor from which the latter will have crystallized. To obtain the *cinchonia* separate, the following method, originally suggested by Pelletier and Caventou, may be employed. Magnesia, lime, or a solution of potassa as employed by M. Callaud, is added to the mother waters in excess. The cinchonia is precipitated together with a portion of quinia which has remained in the solution, and with the excess of magnesia or lime if one of these earths has been employed. The precipitate is collected on a filter, washed with hot water, then dried, and treated with boiling alcohol, which dissolves the vegetable alkalies. The alcoholic solution is filtered while hot, and the residue afterwards treated in the same manner with successive portions of alcohol, till it is quite exhausted. The solutions, having been mixed together, are now concentrated by the distillation of the alcohol, and allowed to cool, when they deposite cinchonia in the crystalline state. Successive evaporations and refrigerations afford new crops of crystals, and the process should be continued till no more can be obtained. The cinchonia thus procured, if impure, should be reconverted into a sulphate and treated as before, animal charcoal being employed to free it from colour. The quinia which remains in the mother waters, as it will not crystallize, may be obtained by evaporation to dryness, or may be converted into the crystallizable sulphate by the addition of sulphuric acid. To obtain the *sulphate of cinchonia*, mix the alkali with a small quantity of water, heat the mixture, and add gradually dilute sulphuric acid sufficient to saturate it; then boil with animal charcoal previously washed with muriatic acid, and filter the liquor while hot. Upon cooling it will deposite crystals of the sulphate, and by repeated evaporation and crystallization, will yield all the salt which it holds in solution.

Properties. Sulphate of quinia is in fine, silky, slightly flexible, needle-shaped crystals, interlaced among each other, or grouped in small star-like tufts. Its taste is intensely bitter, resembling that of the yellow bark. Exposed to a moderate heat, it loses its crystalline form in consequence of the escape of its water of crystallization. At a temperature of 212° it becomes luminous, especially when rubbed. At a still higher heat it melts, assuming the appearance of wax. It is very slightly soluble in cold water, requiring, according to M. Baup, 740 parts at 54° F. for solution, while at the boiling point it is dissolved in 30 parts. Its cold solution is opalescent. It is very soluble in alcohol, but only to a very small extent in ether. The diluted acids, even tartaric and oxalic acids, in excess, dissolve it with great facility. With sulphuric acid it forms a *supersulphate*, which is much more soluble in water than the neutral salt, and crystallizes from its solution with much greater difficulty. It is this salt which remains in the mother waters when an excess of acid is added in the process for procuring the sulphate of quinia. According to M. Baup, it is soluble in 11 parts of water at 54° F., and in its own water of crystallization at the boiling point. It is very soluble in diluted, and somewhat less so in absolute alcohol. The proportions of the constituents of the sulphates of quinia are stated somewhat differently by different chemists. We present the results as obtained by Robiquet. (*Dict. des Drogues.*)

Neutral Sulphate, Subsulphate of Berzelius.	
Sulphuric acid	10.
Quinia	80.9
Water	9.1

Supersulphate, Neutral Sulphate of Berzelius.	
Sulphuric acid	19.1
Quinia	63.5
Water	17.4

M. Baup, however, whose statement corresponds closely, so far as regards the proportions of the acid and base, with the analysis of Pelletier and Caventou, and is confirmed by the experiments of Winkler and of Buchner, gives as the constituents of the crystallized neutral sulphate, 76.272 parts of quinia, 8.474 of sulphuric acid, and 15.254 parts of water in the hundred. According to the same author, the neutral sulphate effloresces on exposure to the air, losing all but 2 or 3 per cent. of its water of crystallization, while the supersalt is permanent, unless heated or exposed to the action of substances having a strong affinity for water. (*Journ. de Pharm.* vii. 403.) When melted, it parts with all its water of crystallization. In this state it consists, according to Liebig, of 10 parts of acid, 85,83 of base, and 4.17 of water, which cannot be separated from it. By this chemist and by Berzelius it is considered as a subsulphate, consisting of two equiv. of quinia, one of sulphuric acid, and two of water.

Sulphate of quinia is decomposed by the alkalies and alkaline earths. In solution, it affords precipitates with potassa, soda, and ammonia, which are partly soluble in an excess of alkali. Tartaric, oxalic, and gallic acids, and their soluble salts, are said to precipitate the solutions of quinia; but these acids have no such effect on the sulphate if added in excess.

M. Henry asserts, that neither gallic acid nor a neutral gallate occasions a precipitate with the sulphate of quinia, and ascribes that which is formed by the tincture and infusion of galls to a combination of the quinia with tannin. Hence red wines, and astringent solutions generally, are incompatible with sulphate of quinia. (*Journ. de Pharm.* ii. 331.) The soluble salts of baryta occasion a precipitate insoluble in water and the acids.

Adulterations. The high price of sulphate of quinia has led to various attempts at adulteration. Sulphate of lime, sugar, mannite, starch, and stearin are among the substances which have been fraudulently added. By attending to the degree of solubility of the sulphate in different menstrua, and to its chemical relations with other substances already described, there can be little difficulty in detecting these adulterations. The presence of any mineral substance not readily volatilizable, may be at once ascertained by exposing the salt to a red heat, which will completely destroy the sulphate of quinia, leaving the mineral behind.

Medical Properties and Uses. Sulphate of quinia produces upon the system, so far as we are enabled to judge by observation, the same effects with Peruvian bark, without being so apt to nauseate and oppress the stomach. (See *Cinchona.*) It may, therefore, be substituted for that remedy in all diseases to which the latter is applicable; and in the treatment of intermittents it has proved so efficacious as to have almost entirely superseded the use of bark. It has the advantage over this remedy, not only that it is more easily administered in large doses, and more readily retained by the stomach, but that in cases which require an impression to be made through the rectum or the skin, it is much more effectual, because, from the smallness of its bulk, it is more readily retained in the former case, and more speedily absorbed in the latter. Still we cannot be certain that there are not other active principles in bark besides the quinia and cinchonia, the latter of which possesses properties analogous to those of the former; nor that the mode of combination in which these principles exist, may not so modify their action as to render them more effectual in certain forms of disease. The question can be solved only by careful and long continued observation. In the mean time, we may resort to the bark if the sulphate of quinia should not answer the ends in view; and instances have occurred under our own notice, in which it has proved successful in intermittents after the salt has failed.

The sulphate of quinia may be given in pill or solution, or suspended in water by the invention of syrup and mucilage. The form of pill is usually preferred. (See *Pilulæ Quiniæ Sulphatis.*) The solution may be readily effected by the addition of a little acid of almost any kind to the water. Eight grains of the sulphate will dissolve in a fluidounce of water acidulated with about twelve minims of the diluted sulphuric acid, or aromatic sulphuric acid of the Pharmacopœias; and this is the most eligible mode of exhibiting the medicine in the liquid form. The addition of a small proportion of sulphate of morphia or of laudanum, will often be found advantageous when the stomach is disposed to be sickened, or the bowels to be disturbed by the quinia.

Twelve grains of the sulphate of quinia are equivalent to about an ounce of good bark. The dose varies exceedingly, according to the circumstances of the patient and the object to be accomplished. As a tonic simply, a grain may be given three or four times a day, or more frequently in acute cases. In intermittents, from twelve to twenty-four grains should be given between the paroxysms, divided into smaller or larger doses according to the condition of the stomach or the length of the intermission. From one to four grains may be given at once, and some even advise the whole quantity. When the stomach will not retain the medicine, it may be administered with nearly as much efficacy by enema; from six to twelve grains with two fluidounces of liquid starch, and from twenty to forty drops of laudanum, being injected into the rectum every six hours. Should circumstances render this mode of application impracticable, an equal quantity, diluted with arrow root or other mild powder, may be sprinkled, at the same intervals, upon a blistered surface denuded of the cuticle. The epigastrium, or the inside of the thighs and arms, would be the proper place for the blister. W.

QUINIÆ SULPHAS IMPURUS. *U.S. Impure Sulphate of Quinia.*

"Evaporate the liquor, poured off from the crystals of Sulphate of Quinia, to the consistence of a pilular mass." *U.S.*

The only caution necessary in conducting this process, is to avoid such a degree of heat as would decompose the product to be obtained.

This preparation has been known and employed for several years in Philadelphia, under the absurd name of *extract of quinine.* Experience having fully proved its efficiency as a medicine, it was, with great propriety, introduced into the last edition of the U.S. Pharmacopœia, with a name, which, though not exactly expressive of its nature, has the merit at least of not being incorrect, and could not perhaps be supplied by a better.

It is of a dark brown colour, of a very bitter taste resembling that of quinia, and, when perfectly dry, is hard and brittle, breaking with a shining resinous fracture. It is partially soluble in water, entirely so in alcohol, and in water acidulated with sulphuric acid. Different views have been advanced in relation to its chemical nature. Sertürner, in the year 1829, announced that he had discovered in the mother waters, remaining after the crystallization of the sulphate of quinia, a peculiar alkaline principle which he called *chinoïdine*, and to which he ascribed extraordinary powers in the cure of disease. Having been in the habit for several years previously to this period, of employing the substance obtained by the evaporation of these waters, and having found its effects in all respects identical with those which we had been accustomed to procure from the salt of quinia, we could not but doubt the correctness of Sertürner's conclusions, and were quite prepared for the contradiction which they soon afterwards met with from MM. Henry Jun. and Delondre. By these chemists it has been satisfactorily shown, that what Sertürner mistook for a new alkali, was a mixture of cinchonia and quinia, with a peculiar yellowish resinoid matter, which prevented their crystallization. By the destruction of this matter, the nature of which has not been accurately investigated, the two alkalies were obtained separate. The active ingredients, therefore, of the preparation designated in the Pharmacopœia as the *impure sulphate of quinia*, are the sulphate of cinchonia and the sulphate of quinia.

Medical Properties and Uses. So far as we have been able to judge from much experience, the effects of this preparation upon the system are the same with those of the pure sulphate, for which it may be advantageously substituted in all cases in which the cost of medicine is a matter of much consequence. If we have discovered any difference, it is that the impure sulphate is rather more apt to prove offensive to the stomach. It was first employed by the late Dr. Samuel Emlen, about the year 1825, at the suggestion of Mr. John Farr, chemical manufacturer, of Philadelphia.

The dose is double that of the pure sulphate. It may be given in pill, (see *Pilulæ Quiniæ Sulphatis Impuri*,) or in the state of solution, or mixed with water by the intervention of mucilage. The solution may be readily effected by acidulating the water with sulphuric acid. We have seldom found intermittents to resist twenty-four grains of the impure sulphate given between the paroxysms; though a larger quantity may be employed with safety and greater certainty of success.

Off. Prep. Pilulæ Quiniæ Sulphatis Impuri, *U. S.* W.

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SODA.

Preparations of Soda.

SODÆ CARBONAS EXSICCATUS. *U.S.* SODÆ SUBCARBONAS EXSICCATA. *Lond.* SODÆ CARBONAS SICCATUM. *Dub.* *Dried Carbonate of Soda.*

"Take of Carbonate of Soda *any quantity*. Expose it to heat, in a clean iron vessel, until it is thoroughly dried, stirring constantly with an iron spatula; then rub it into powder." *U. S.*

The *London College* takes a pound of the salt and exposes it to a boiling heat; and in other respects treats it precisely as directed in the U.S. formula.

"Liquefy the crystals of Carbonate of Soda in a silver crucible over the fire. Then, having increased the heat, stir the liquefied salt, until, by the evaporation of the water, it becomes dry. Reduce it to fine powder, and keep it in close vessels." *Dub.*

Carbonate of soda contains ten equivalents of water of crystallization, and, when heated, readily undergoes the watery fusion. Upon continuing the heat, the water is dried off, and a white porous mass remains, which is easily reduced to powder, and constitutes the preparation under consideration. Dried carbonate of soda is in the form of a white powder, and differs in no respect from the carbonate, except in being devoid of water of crystallization. (See *Sodæ Carbonas.*)

Medical Properties and Uses. This preparation was introduced into regular practice on the recommendation of Dr. Beddoes, who extolled its virtues in calculous complaints. It is only applicable to the cure of such affections, when dependent on a morbid secretion of uric acid. Its advantage over the common carbonate is that it admits of being made up into pills, in consequence of being in the dried state. As the water of crystallization forms more than half of the carbonate, the dose of the dried salt must be reduced in proportion. From five to fifteen grains may be given three times a day in the form of pill, prepared with soap and aromatics. The general medical properties of this salt have been given under another head. (See *Sodæ Carbonas.*)

Off. Prep. Sodæ Sulphuretum, *U.S.* B.

SODÆ CARBONATIS AQUA. *Dub. Water of Carbonate of Soda.*

"Take of Carbonate of Soda, *any quantity.* Dissolve it in Distilled Water, so as to form a solution of the specific gravity 1,024. A solution of this density is obtained by dissolving *an ounce* of Carbonate of Soda in *a pint* of Distilled Water." *Dub.*

This preparation furnishes a solution of carbonate of soda of determinate strength, each fluidounce of which contains half a drachm of the salt. It is convenient for prescribing the alkali in solution, and forming effervescing draughts, each fluidounce being staturated, on an average, by half a fluidounce of lemon juice. The dose is from one to two fluidounces, sufficiently diluted with water, and given two or three times a day. B.

SODÆ BICARBONAS. *U.S., Dub.* SODÆ CARBONAS. *Lond.* CARBONAS SODÆ. *Ed. Bicarbonate of Soda.*

"Take of Carbonate of Soda [Subcarbonate, *Lond,*] *a pound;* Distilled Water *three pints.* Dissolve the Carbonate of Soda [Subcarbonate, *Lond.*] in the Distilled Water, and pass Carbonic Acid through the solution, till it is fully saturated; then set it aside to crystallize. Dry the crystals, wrapped in bibulous paper, and compressed. Evaporate the remaining solution with a heat not exceeding one hundred and twenty degrees, so that more crystals may be produced. Let these be compressed and dried in the same manner as the former." *U.S., Lond.*

"Carbonic Acid is obtained from Hard Carbonate of Lime, by the addition of Dilute Sulphuric Acid." *U.S.*

"Take of Sub-Carbonate of Soda *two parts;* Water *three parts.* Dissolve the Salt in the Water, and pass through it a stream of Carbonic Acid gas, until it ceases to be absorbed. Then filter the liquor, and evaporate with a heat not exceeding one hundred and eighty degrees, so that it may form a crystalline mass. Carbonic Acid is most easily obtained from equal weights of Carbonate of Lime in powder, and of Sulphuric Acid diluted with much water." *Ed.*

"Take of Carbonate of Soda *two parts;* Water *five parts.* Dissolve, and in a proper apparatus, expose the solution to a stream of Carbonic Acid gas, evolved during the solution of White Marble in dilute Muriatic Acid, until it ceases to absorb gas; and let it remain at rest that crystals may form. Then, with a heat not exceeding one hundred and twenty degrees, evaporate the solution that crystals may again be formed, which are to be mixed with those first obtained, dried, and preserved in a close vessel." *Dub.*

In these processes, the alkali combines with an additional quantity of carbonic acid, and a salt is formed, which, being less soluble than the original salt employed, precipitates in minute crystals. The solution poured off from these still contains a considerable quantity of the same salt, and hence the Pharmacopœias direct its evaporation by heat, so as to obtain a second crop of crystals. The heat should be as moderate as possible; but still, with the observance of every precaution, it is impossible to prevent the loss of some carbonic acid, whereby the salt is deteriorated, and rendered variable in composition. Under these circumstances, the lower heat directed in the U. S., London, and Dublin processes, is preferable to that prescribed by the Edinburgh College.

The principal objection to the officinal processes is, that so large a quantity of water is employed, as to make subsequent evaporation necessary. This may be avoided in several ways. Thus Dr. Thomson recommends that a concentrated solution of the ordinary carbonate should be suspended in a distiller's fermenting tun. In this case the bicarbonate, from its comparatively sparing solubility, and the small quantity of water used, is nearly all deposited in crystals. Berzelius gives a better process, as follows. Mix intimately four parts of the effloresced carbonate of soda with one part of the crystallized salt reduced to fine powder, and expose the mixture to the action of an atmosphere of carbonic acid gas, generated either in a liquid undergoing the vinous fermentation, (see p. 946), or by the decomposition of carbonate of lime by sulphuric acid. The saline matter obtained is then washed with cold water, to remove any carbonate which may not have been saturated. Berzelius does not explain why, in this process, the effloresced is mixed with the crystallized carbonate; but from the proportions employed, the reason, we think, is obvious; namely, to have present no more water of crystallization than can be taken up by the resulting bicarbonate. In this way, any excess of water is guarded against, which, by being liberated, might render it necessary to resort to evaporation, and thus hazard the partial decomposition of the salt.

The mode in which the salt under consideration is prepared in the United States, has been described by Mr. Franklin R. Smith, druggist of Philadelphia, in an interesting paper, published in the first volume of the Journal of the Philadelphia College of Pharmacy. As this mode is somewhat peculiar, we give an outline of the process, derived from Mr. Smith's paper. The ordinary carbonate of soda is placed in a box, and surrounded by an atmosphere of carbonic acid gas under pressure. As the bicarbonate combines with much less water of crystallization than is contained in the carbonate, a considerable portion of water is liberated, which, saturated with part of the salt, is allowed to drain off. When the gas ceases to be absorbed, the salt is taken out and dried. Upon examination it is found to have retained the original form of the pieces; but they have become of a porous and loose texture, presenting the appearance of numerous crystalline grains, aggregated together, and having a snow-white colour.

The above process, as Mr. Smith justly remarks, is much to be preferred to those of the Pharmacopœias, as solution and subsequent evaporation are entirely avoided; but the partial liquefaction of the salt, in consequence of the liberation of the water of crystallization, is an objection to it, which is obviated by the method already given from Berzelius, of having present only so much water of crystallization as may be necessary to accommodate the new salt formed.

Mr. Smith found, on analysis, that samples of reputed bicarbonate in our shops were intermediate, in the proportion of carbonic acid, between the bicarbonate and sesquicarbonate, and has shown that the variation depends upon the admixture of more or less of the ordinary carbonate. This he proved by washing a small portion of the recently prepared salt with a little water, which was found to remove carbonate; and the remaining salt, on analysis, proved to be the true bicarbonate. Mr. Smith then suggests that the process of our manufacturers might be improved by washing the saline product with a small quantity of water; and it is seen above, that in the process quoted from Berzelius, this course is adopted. For further details, the reader is referred to Mr. Smith's paper.

Properties, &c. This salt, prepared according to the officinal directions, is in the form of small crystals, or of a crystalline mass, of a snow-white colour and mild alkaline taste. It is soluble in thirteen times its weight of cold water; but boiling water decomposes it with disengagement of carbonic acid, and evaporation even at a gentle heat produces the same effect on its solution. If obtained by evaporation to dryness, if forms white crusts, and so much carbonic acid is lost as to reduce it to the state of sesquicarbonate. When exposed to a red heat, it loses the carbonic acid which it had acquired in the saturation, and returns to the state of ordinary carbonate. The salt, however, which passes under the name of "bicarbonate of soda" in the shops, is generally in the form of a white powder of uncertain composition, having been pulverised for the convenience of the apothecary. Of the perfect bicarbonate, every 84.54 parts lose, by complete decomposition by dilute sulphuric acid, 44.24 parts of carbonic acid. The incompatibles of this salt are the same with those of the ordinary carbonate, except that when fully saturated, it does not decompose the sulphate of magnesia without the aid of heat.

Composition. The officinal salt should consist of two equiv. of carbonic acid 44.24, one of soda 31.3, and one of water 9 = 84.54; but it seldom contains so large a proportion of carbonic acid. The first crop of crystals obtained in the U.S., London, and Dublin processes, may in the moist state, be considered as the true bicarbonate; but whenever the crystals are the product of evaporation, they contain less carbonic acid than the bisalt. The salt as procured by the method of our manufacturers is intermediate between the sesquicarbonate and bicarbonate, as determined by the analysis of Mr. Smith; while the product obtained by evaporation to dryness is a sesquicarbonate corresponding in nature with the carbonate of Egypt and Hungary, called *trona*. On account of its variable composition, it is difficult to give it an appropriate name; but "bicarbonate of soda," in allusion to what its composition ought to be when perfect, is, perhaps, the least exceptionable. With regard to the officinal nomenclature of carbonated soda, precisely the same confusion prevails, which has been explained under the head of bicarbonate of potassa. (See page 947.)

Medical Properties and Uses. This salt has the same medical properties as the ordinary carbonate, but, from its mild taste, proves more acceptable to the palate and stomach; while its superabundant acid has no power to interfere with its action as an alkaline remedy. It is often resorted to in calculous cases, characterised by predominant uric acid; and from its higher neutralizing power on account of the smaller equiv. of soda, it may be considered preferable as an antacid to the corresponding salt of potassa. It is principally employed in making what are called soda and Seidlitz powders. (See page 47.) It is sometimes made up into lozenges with sugar and gum Arabic, in the proportion of one part of the salt to nineteen of sugar, and employed as a remedy in indigestion arising from acidity. Several lozenges, each weighing twenty grains, may be taken at a time. The dose is from ten grains to a drachm, and is taken most conveniently in a glass of carbonic acid water. B.

AQUA SUPER-CARBONATIS SODÆ. *Ed.* AQUA CARBONATIS SODÆ ACIDULA. *Dub.* *Water of Super-Carbonate of Soda. Acidulous Water of Carbonate of Soda.*

"Take of Water *ten pounds;* Sub-Carbonate of Soda *two ounces.* Dissolve and pass through the solution a stream of Carbonic Acid gas, arising from powdered Carbonate of Lime, Sulphuric Acid, each, *three ounces,* Water *three pounds,* gradually and cautiously mixed. Nooth's apparatus is well adapted for this process. But if a larger quantity of this solution is required, an apparatus must be used capable of furnishing sufficient pressure. The solution should be kept in well stopped vessels." *Ed.*

"Take of Carbonate of Soda *any quantity.* Dissolve it in such a quantity of Water, that each *pint* may contain *a drachm* of Carbonate of Soda. Then, in an apparatus adapted for retaining the gas, subject it to a stream of Carbonic Acid gas, evolved during the solution of pieces of White Marble in Muriatic Acid, diluted with six times its weight of Water until the Carbonic Acid is in excess." *Dub.*

These preparations may be considered as solutions of bicarbonate of soda in carbonic acid water. They correspond with the solution formerly called *soda water,* which was made by impregnating under strong pressure, a weak solution of carbonate of soda with carbonic acid; but at present, this name is applied, in popular language, to carbonic acid water without soda. The solution formed according to the Edinburgh formula, contains about two drachms of the carbonate to a pint; which makes it twice as strong as the Dublin preparation. These solutions, however, are superfluous; as they may be made extemporaneously by adding any desired quantity of carbonate of soda to carbonic acid water. (See *Aqua Acidi Carbonici* and *Aqua Super-Carbonatis Potassæ.*) B.

SODÆ ET POTASSÆ TARTRAS. *U.S., Dub.* SODA TARTARIZATA. *Lond.* TARTRAS SODÆ ET POTASSÆ. *Ed.* *Tartrate of Potassa and Soda. Tartarized Soda. Rochelle Salt.*

"Take of Carbonate of Soda [Subcarbonate, Lond.] *twenty ounces;* Supertartrate of Potassa [cream of tartar], in powder, *two pounds;* Boiling Water *ten pints.* Dissolve the Carbonate of Soda in the Water, and gradually add the Supertartrate of Potassa. Filter the solution through paper; then evaporate it until a pellicle forms, and set it aside to crystallize. Pour off the liquor, and dry the crystals on bibulous paper." *U S., Lond.*

"Take of Sub-Carbonate of Soda *one part;* Super-Tartrate of Potassa *three parts,* or *a sufficient quantity;* Boiling Water *fifteen parts.* To the Sub-Carbonate, dissolved in the Water, gradually add the Super-Tartrate in fine powder, so long as it produces any effervescence, which commonly ceases before three times the weight of the Sub-Carbonate has been added. Then filter the liquor after it is cold through paper, and after due evaporation, set it aside that crystals may form." *Ed.*

"Take of Carbonate of Soda *five parts;* Bitartrate of Potassa [cream of tartar], in very fine powder, *seven parts;* Boiling Water *fifty parts.* Dissolve the Carbonate of Soda in the Water, and gradually add the Bitartrate of Potassa. Filter the liquor through paper, evaporate, and set it aside, so that on slow cooling crystals may form." *Dub.*

This is a double salt, consisting of tartrate of potassa combined with the tartrate of soda. The theory of its formation is exceedingly simple, being merely the saturation of the excess of acid in the bitartrate of potassa, by means of carbonate of soda, the carbonic acid of which, being extricated, causes the effervescence. The proper quantities of the materials for mutual saturation are 143.42 parts of carbonate to 189.11 of bitartrate, or one equiv. of each. This gives the ratio of 10 to 13.1. Now the carbonate is to the bitartrate as 10 to 12 in the U.S. and London formula, as 10 to 30 in the Edinburgh, and as 10 to 14 in the Dublin. The Dublin proportion is, therefore, the nearest to the theoretical quantities, while the Edinburgh presents a great excess of bitartrate, supposing the whole quantity directed to be employed; but if the directions of the Edinburgh College be strictly followed, the addition of the cream of tartar is desisted from as soon as effervescence ceases. As the salts employed are apt to vary in composition and purity—the carbonate from the presence of more or less water of crystallization, and the bitartrate from that of tartrate of lime—it is best in all cases, after giving the nearest average proportion as a general guide, to present to the operator the alternative of using the cream of tartar to the point of exact saturation.

Berzelius states that this salt may be formed by saturating six parts of cream of tartar by means of carbonate of potassa, and then adding to the resulting tartrate a solution of five parts of crystallized sulphate of soda. On evaporation, sulphate of potassa will first crystallize, and afterwards the tartrate of potassa and soda. The rationale is obvious.

Properties. Tartrate of potassa and soda is in the form of white, transparent, slightly efflorescent crystals, often very large, and having the shape, when carefully prepared, of right prisms, with ten or twelve unequal sides. As ordinarily crystallized, they are generally in half prisms, as if split in the direction of their axis. Its taste is saline and slightly bitter. It dissolves in two and a half times its weight of cold water, and in much less boiling water. (*Berzelius.*) When exposed to a strong heat, the tartaric acid is destroyed, and a mixture of the carbonate of potassa and soda is left. It sometimes contains tartrate of lime, which may be removed by solution and crystallization; but when its crystals are large and well defined, it may be assumed to be pure. It is incompatible with most acids, and with all acidulous salts except the bitartrate of potassa. It is also decomposed by the acetate and subacetate of lead, and by the soluble salts of lime and of baryta. The way in which acids act in decomposing it, is by combining with the soda, and precipitating bitartrate of potassa. This double salt was discovered by Seignette, an apothecary of Rochelle; and hence it is frequently called *Seignette's salt*, or *Rochelle salt*.

Composition. Tartrate of potassa and soda consists of two equiv. of tartaric acid 132.96, one of potassa 47.15, one of soda 31.3, and, according to Berzelius, ten of water 90=301.41; or, considered as a double salt, of one equiv. of tartrate of potassa 113.63, and one of the tartrate of soda 97.78, with the same quantity of water. According to some authorities, it contains only eight equivalents of water of crystallization; and Phillips and Brande have erroneously stated that it contains none. The probability is, that, according to the mode of crystallization, it may contain either eight or ten equiv. of water.

Medical Properties and Uses. This salt is a mild, cooling purgative, well suited to delicate and irritable stomachs, being among the least unpalatable of the neutral salts. As it is not incompatible with tartar emetic, it may be associated with that salt in solution. It is an ingredient in the effervescing aperient called Seidlitz powders, the composition of which is given at page 47. The dose is from an ounce to an ounce and a half. B.

SODÆ PHOSPHAS. *U.S.*, *Dub.* PHOSPHAS SODÆ. *Ed.* *Phosphate of Soda.*

"Take of Bone, burnt to whiteness and powdered, *ten pounds;* Sulphuric Acid *six pounds;* Carbonate of Soda *a sufficient quantity.* Mix the powdered Bone with the Sulphuric Acid in an earthen vessel; then pour in a gallon of water, and stir them well together. Macerate for three days, occasionally adding a little water to prevent dryness, and frequently stirring the mixture. At the expiration of this time, pour in a gallon of boiling water, and strain through linen, gradually adding more boiling water, until the acid is entirely washed away. Set by the strained liquor that the dregs may subside, from which pour off the clear solution, and boil it down to a gallon. To this solution, poured off from the dregs, and heated in an earthen vessel, add by degrees the Carbonate of Soda, previously dissolved in hot water, until effervescence ceases; then filter the liquor, and set it aside to crystallize. Having removed the crystals, add to the liquor, if necessary, a small quantity of Carbonate of Soda, so as accurately to saturate the phosphoric acid; then alternately evaporate and crystallize, so long as any crystals are produced. Lastly, preserve the crystals in a well stopped bottle." *U.S.*

The above is the *Edinburgh* process, with some slight changes in the details, and with the substitution of "gallon" for the quantity "nine pounds" wherever it occurs in the original.

"Take of burnt Bones, in powder, *ten parts;* Commercial Sulphuric Acid *seven parts.* Mix the powder, in an earthen vessel, with the Sulphuric Acid, and gradually add *seven parts* of water, and stir the mixture. Digest for three days, occasionally adding more water to prevent the matter from becoming dry, and continue the stirring: then add *seven parts* of boiling water, and strain through linen, repeatedly pouring on boiling water, until all the acid is washed out. Set the liquor by that the dregs may subside, from which pour it off when clear, and reduce it by evaporation to one-half. Then add *eight parts* of Carbonate of Soda, dissolved in hot water, and filter; and by alternate evaporation and refrigeration, let crystals be formed, which are to be kept in a well stopped vessel. If the salt be not sufficiently pure, dissolve it again in water, and recrystallize." *Dub.*

The incombustible part of bones, which is obtained by burning them to whiteness, consists of phosphate of lime, associated with some carbonate of lime, &c., and is generally called the earth of bones. (See *Os.*) When this is mixed with sulphuric acid, the carbonate of lime is entirely decomposed, giving rise to effervescence. The phosphate of lime undergoes partial decomposition; the greater part of the lime, being detached, precipitates as sulphate of lime, while the phosphoric acid set free, combines with the undecomposed portion of the phosphate, and remains in solution as a superphosphate of lime, holding dissolved a certain portion of the sulphate of lime. In order to separate the superphosphate from the precipitated mass of sulphate of lime, boiling water is added to the mixture, and the whole is strained, and the sulphate washed as long as superphosphate is removed, which is known by the water passing through in an acid state. The different liquids which have passed the strainer, consisting of the solution of superphosphate of lime, are mixed and allowed to stand, and by cooling a portion of sulphate of lime is deposited, which is got rid of by decantation.

The bulk of the liquid is now reduced by evaporation, and from the diminution of the water, a fresh portion of sulphate of lime becomes deposited, which is separated by subsidence and decantation as before. The superphosphate of lime is now saturated by means of carbonate of soda. The carbonic acid is extricated with effervescence, and the alkali, combining with the *excess* of acid of the superphosphate, generates phosphate of soda; while the superphosphate of lime, by the loss of its excess of acid, becomes the neutral phosphate, and precipitates. This precipitate is next separated by a new filtration; and the filtered liquor, consisting of the solution of phosphate of soda, is evaporated so as to crystallize.

In the U.S. and Edinburgh process, the calcined bone is to the acid as 10 to 6; in the Dublin process as 10 to 7. The proportion recommended by Berzelius is intermediate—as 10 to 6.66. The acid, in the officinal processes, is added to the bone in the concentrated state, and afterwards diluted with more or less water. In the process given by Berzelius it is first diluted with twelve times its weight of water. The Dublin College prescribes the quantity of carbonate of soda to effect the saturation; but the exact quantity cannot be known beforehand, and must vary under different circumstances. All the writers state that this salt crystallizes more readily by allowing its solution to be slightly alkaline; and what is remarkable is, that a neutral solution, when it crystallizes, leaves a supernatant liquid which is slightly acid and uncrystallizable. Hence it is necessary, after getting each successive crop of crystals, to render the mother water neutral or slightly alkaline, before it will furnish an additional quantity.

M. Funcke, a German chemist, has given the following method for obtaining phosphate of soda, which is stated to be cheaper and more expeditious than the process above described. Add to the powdered calcined bone, diffused in water, sufficient dilute sulphuric acid to decompose all the carbonate of lime which it may contain. As soon as the effervescence has ceased, the matter is acted on with nitric acid, which dissolves the phosphate of lime, and leaves the sulphate. The nitric solution of the phosphate is then treated with sulphate of soda, equal in quantity to the bone employed; and after the reaction is completed, the nitric acid is recovered by distillation. In consequence of a double decomposition, sulphate of lime and phosphate of soda are formed, the latter of which is then separated from the sulphate by the action of water, and crystallized in the usual manner.

Properties, &c. Phosphate of soda is in the form of large, white, efflorescent crystals, which have the shape of oblique rhombic prisms, and possess a pure saline taste, free from all bitterness. With tests, it displays a slight alkaline reaction. It dissolves in four times its weight of cold water, and twice its weight of boiling water. Before the blow-pipe, it first undergoes the aqueous fusion, and afterwards, at a red heat, melts into a globule of limpid glass, which becomes opaque on cooling. It is not liable to any adulterations, but sometimes contains carbonate of soda, from this salt being added in excess; in which case it will effervesce with acids. It is incompatible with neutral salts of lime, as also with neutral metallic solutions. This salt is found in several of the animal fluids, particularly the urine. When crystallized it consists of one equiv. of phosphoric acid 71.4, two of soda 62.6, and twenty-five of water 225=359. When heated gently, it loses twenty-four equiv. of water, retaining one equiv. which acts the part of a base. At a red heat this remaining equiv. of water is driven off, and the salt is altered in its properties, and becomes what is called the *pyrophosphate of soda.*

Medical Properties and Uses. This salt was introduced into regular practice about the year 1800, on the recommendation of Dr. Pearson of London. It is a mild purgative, and from its pure saline taste, is well adapted to the cases of children, and of persons of delicate stomach. The dose is from one to two ounces, and is best given in gruel, or weak broth, to which it communicates a taste, as if seasoned with common salt. B.

SODÆ SULPHURETUM. *U.S. Sulphuret of Soda.*

"Take of Sulphur *an ounce;* Dried Carbonate of soda *two ounces.* Mix them, and melt the mixture over the fire, in a covered crucible; then pour out the melted mass, and when it is cold, put it into a bottle, which must be well stopped." *U.S.*

This preparation is a mixture of sulphuret of sodium and sulphate of soda, which are formed in consequence of reactions precisely similar to those which occur in the preparation of sulphuret of potassa. (See *Potassæ Sulphuretum.*)

This sulphuret has the same medical properties as the sulphuret of potassa, and for this reason may be considered as a superfluous preparation in our Pharmacopœia. B.

SPIRITUS. *U.S., Lond., Dub.*

Spirits.

SPIRITUS STILLATITII. *Ed. Distilled Spirits.*

Spirits, according to the Pharmacopœia of the United States, are alcoholic solutions of volatile principles, obtained by distillation. By the London College the term is extended also to alcohol itself, and to certain solutions in that liquid prepared by simple maceration or digestion. The spirits are prepared chiefly from aromatic vegetable substances, the essential oils of which rise with the vapour of alcohol, and condense with it in the receiver. Some of the oils, however, will not rise at the temperature of boiling alcohol, but may be distilled with water. In this case it is necessary to employ proof spirit or diluted alcohol, with the water of which the oil comes over in the latter part of the process. As the proof spirit of the shops is often impregnated with foreign matters, which give it an unpleasant flavour, it is better to use alcohol which has been carefully rectified, and to dilute it with the due proportion of water, as directed by the U.S. Pharmocopœia. In preparing the spirits, care should be taken to avoid the colour and empyreumatic flavour arising from the decomposition of the vegetable matter by heat. Sufficient water must, therefore, be added to cover the vegetable matter after the alcohol shall have been distilled; and as a general rule, the heat should be applied by means of a water-bath, or of steam. It is proper that the aromatic should be macerated for some days with the alcohol, before being submitted to distillation; as the oil, being thus dissolved, rises more readily with the spirituous vapour, than when confined in the texture of the vegetable. It is necessary, during the process, frequently to renew the water in the refrigeratory, as otherwise a considerable portion of the vapour will escape condensation and be lost.

The aromatic spirits are used chiefly to impart a pleasant odour and taste to mixtures, and to correct the nauseating and griping effects of other medicines. They serve also as carminatives in flatulent colic, and agreeable stimulants in debility of stomach; but their frequent use may lead to the formation of intemperate habits, and should, therefore, be avoided.

The *Edinburgh College* gives the following general directions for the preparation of the distilled spirits. "To the substance to be distilled add nine pounds of Weaker Alcohol. Macerate for two days in a close vessel; then pour on sufficient water to prevent empyreuma, and distil nine pounds." W.

SPIRITUS AMMONIÆ FŒTIDUS. *Lond., Dub.* TINCTURA ASSÆFŒTIDÆ AMMONIATA. *Ed.* *Fetid Spirit of Ammonia.*

"Take of Spirit of Ammonia *two pints;* Assafetida *two ounces*. Macerate for twelve hours; then, by a gentle fire, distil a pint and a half into a cooled receiver." *Lond.*

"Take of Spirit of Ammonia *two pints;* Assafetida *an ounce and a quarter.* Macerate in a close vessel for three days, shaking occasionally; then pour off the clear liquor, and distil a pint and a half." *Dub.*

"Take of Ammoniated Alcohol *eight ounces;* Assafetida *half an ounce.* Digest in a close vessel for twelve hours; then distil eight ounces by the heat of boiling water." *Ed.*

This is a useless preparation. It differs from ammoniated alcohol only in containing a small proportion of the volatile oil of assafetida, which has little other effect than to communicate an unpleasant odour and taste to the spirit. It is colourless at first, but becomes brownish with age. W.

SPIRITUS AMMONIÆ SUCCINATUS. *Lond.* *Succinated Spirit of Ammonia.*

"Take of Mastich *three drachms;* Rectified Spirit *nine fluidrachms;* Oil of Lavender *fourteen minims;* Oil of Amber *four minims;* Solution of Ammonia *ten fluidounces.* Macerate the Mastich in the Spirit, that it may be dissolved, and pour off the clear tincture; then add the other ingredients, and shake them all together." *Lond.*

This was intended as a substitute for the *eau de luce.* It has a milky appearance, owing to the separation of the mastich from its alcoholic solution by the water of ammonia. Its properties are essentially those of the ammoniacal ingredient, the mastich having no medical action, and the oils of lavender and amber being in too small proportion to serve any other purpose than that of imparting flavour. It is used chiefly as a powerful stimulant, applied to the nostrils, in cases of fainting and torpor. The dose for internal use is from ten to thirty drops. W.

SPIRITUS ANISI. *Lond.* *Spirit of Aniseed.*

"Take of Anise Seeds, bruised, *half a pound;* Proof Spirit *a gallon;* Water *sufficient to prevent empyreuma.* Macerate for twenty-four hours; then, by a gentle fire, distil a gallon." *Lond.*

SPIRITUS ANISI COMPOSITUS. *Dub.* *Compound Spirit of Aniseed.*

"Take of Anise Seeds, bruised, Angelica Seeds, bruised, each, *half a pound;* Proof Spirit *a gallon;* Water *sufficient to prevent empyreuma.* Macerate for twenty-four hours, and distil a gallon." *Dub.*

The dose of this and the preceding preparation, as stomachics and carminatives, is one or two fluidrachms. The compound spirit is a simplification of the Irish *usquebaugh.* W.

SPIRITUS ARMORACIÆ COMPOSITUS. *Lond., Dub.* *Compound Spirit of Horse-radish.*

"Take of fresh Horse-radish Root, sliced, dried Orange Peel, each, *a pound;* Nutmegs, bruised, *half an ounce;* Proof Spirit *a gallon;* Water *sufficient to prevent empyreuma.* Macerate for twenty-four hours; then, by a gentle fire, distil a gallon." *Lond., Dub.*

This may be used advantageously as an addition to diuretic remedies, in dropsy attended with debility, especially in the cases of drunkards. The dose is from one to four fluidrachms. W.

SPIRITUS CARUI. *Lond., Dub.* SPIRITUS CARI CARUI. *Ed.* *Spirit of Caraway.*

"Take of Caraway Seeds, bruised, *a pound and a half* [a pound, *Dub.*]; Proof Spirit *a gallon;* Water *sufficient to prevent empyreuma.* Macerate for twenty-four hours; then, with a gentle fire, distil a gallon." *Lond., Dub.*

The *Edinburgh College* prepares the Spirit from half a pound of the bruised seeds, according to their general directions. (See page 977.) The dose as a carminative is one or two fluidrachms. W.

SPIRITUS CINNAMOMI. *Lond., Dub.* SPIRITUS LAURI CINNAMOMI. *Ed.* *Spirit of Cinnamon.*

"Take of Oil of Cinnamon, by weight, *five scruples;* Rectified Spirit *four pints and a half.* Add the Spirit to the Oil, and pour on them so much water, that, after the distillation, sufficient may remain to prevent empyreuma; then, by a gentle fire, distil a gallon." *Lond.*

"Take of Cinnamon Bark, bruised, *a pound;* Proof Spirit *a gallon;* Water *sufficient to prevent empyreuma.* Macerate for twenty-four hours, and distil a gallon." *Dub.*

By the *Dublin College* the spirit is also prepared by distilling together six scruples of the oil, and a gallon of proof spirit.

The *Edinburgh College* prepares it from a pound of bruised cinnamon, according to their general directions. (See page 977.)

The spirit of cinnamon is an agreeable aromatic cordial, and may be given in debility of stomach in the dose of one or two fluidrachms. W.

SPIRITUS COLCHICI AMMONIATUS. *Lond.* *Ammoniated Spirit of Meadow-saffron.*

"Take of Seeds of Meadow-saffron, bruised, *two ounces;* Aromatic Spirit of Ammonia *a pint.* Macerate for fourteen days, and filter." *Lond.*

This should be placed among the tinctures. It may be employed for the same purposes as the wine of colchicum, in cases which require or admit of an active stimulant. The dose is from thirty drops to a fluidrachm. The preparation, however, is scarcely ever used in this country. W.

SPIRITUS JUNIPERI COMPOSITUS. *U.S., Lond., Ed., Dub.* *Compound Spirit of Juniper.*

"Take of Juniper [berries], bruised, *a pound;* Caraway [seeds], bruised, Fennel-seed, bruised, each, *an ounce and a half;* Diluted Alcohol *a gallon;* Water *sufficient to prevent empyreuma.* Macerate for twenty-four hours; then, with a slow fire, distil a gallon." *U.S.*

The *London* and *Dublin* processes are essentially the same with the above; the *Edinburgh* differs in directing nine pounds of diluted alcohol, maceration for two days, and the distillation of nine pounds of spirit. According to the United States and London processes, the maceration is performed with both the diluted alcohol and water; according to those of Dublin and Edinburgh, only with the former, the water being added at the time of distillation.

This spirit is a useful addition to the diuretic infusions and mixtures in debilitated cases of dropsy. W.

SPIRITUS LAVANDULÆ. *U.S., Lond., Dub.* SPIRITUS LAVANDULÆ SPICÆ. *Ed. Spirit of Lavender.*

"Take of fresh Lavender [flowers] *two pounds;* Alcohol *a gallon;* Water *sufficient to prevent empyreuma.* Macerate for twenty-four hours; then, with a slow fire, distil a gallon." *U.S.*

The *London* process is the same with the above. The *Dublin College* employs a gallon of proof spirit, instead of rectified spirit or alcohol, and directs five pints only to be distilled. The *Edinburgh College* takes eight pounds of alcohol, and distils seven by means of a water-bath, omitting the addition of water to the materials.

The Dublin process, in which proof spirit is employed, is said to yield a product less highly impregnated with the oil of lavender than the others. Mr. Brande asserts that the dried flowers produce as fragrant a spirit as the fresh. Spirit of Lavender is used chiefly as a perfume, and as an ingredient in other preparations. The perfume usually sold under the name of *lavender water*, is not a distilled spirit, but an alcoholic solution of the oil, with the addition of other odorous substances. The following is given by Mr. Brande as one of the most approved recipes for preparing it. "Take of rectified spirit of wine five gallons, essential oil of lavender twenty ounces, essential oil of bergamotte five ounces, *essence of ambergris* (made by digesting one drachm of ambergris and eight grains of musk in half a pint of alcohol) half an ounce. Mix."

Off. Prep. Linimentum Camphoræ Compositum, *Lond., Dub.;* Spiritus Lavandulæ Compositus, *U.S., Lond., Ed., Dub.* W.

SPIRITUS LAVANDULÆ COMPOSITUS. *U.S., Lond., Ed., Dub. Compound Spirit of Lavender.*

"Take of Spirit of Lavender *three pints;* Spirit of Rosemary *a pint;* Cinnamon, bruised, *an ounce;* Cloves, bruised, *two drachms;* Nutmeg, bruised, *half an ounce;* Red Saunders, rasped, *three drachms.* Macerate for fourteen days, and filter through paper." *U.S.*

The *London College* omits the cloves, and directs half an ounce only of cinnamon; the *Edinburgh* employs pounds instead of pints, and macerates for seven instead of fourteen days; the *Dublin* orders half an ounce only of cinnamon and an ounce of red saunders; in all other respects, the processes of the British Colleges correspond with that of the U.S. Pharmacopœia.

This is a delightful compound of spices, much employed as an adjuvant and corrigent of other medicines, and as a remedy for gastric uneasiness, nausea, flatulence, and general languor or faintness. The dose is from thirty minims to a fluidrachm, and is most conveniently administered dropped on a lump of sugar. W.

SPIRITUS MENTHÆ PIPERITÆ. *Lond., Ed., Dub. Spirit of Peppermint.*

"Take of Oil of Peppermint, by weight, *six scruples and a half;* Rectified Spirit *four pints and a half.* Add the Spirit to the Oil, and pour upon them so much water, that, after the distillation, sufficient may remain to prevent empyreuma; then, by a gentle fire, distil a gallon." *Lond.*

The *Edinburgh College* prepares this spirit from one pound and a half of peppermint, according to their general directions. (See page 977.)

"Take of Oil of Peppermint, by weight, *half an ounce;* Rectified Spirit *a gallon.* Add the Spirit to the Oil, and pour on them so much water as will prevent empyreuma, after distillation; then, by a gentle fire, distil a gallon." *Dub.*

The effect of the London process is to afford a solution of the oil in proof spirit, as the difference between the four pints and a half of alcohol employed and the gallon distilled must be supplied by water added immediately before distillation. The same is the case with the spirit of spearmint, and the spirit of cinnamon of the same Pharmacopœia.

The spirit of peppermint has no advantage over a simple solution of the oil in alcohol. Such a solution, under the name of *essence of peppermint*, is usually kept in the shops, and is much employed as a domestic remedy. (See *Oleum Menthæ Piperitæ.*) W.

SPIRITUS MENTHÆ VIRIDIS. *Lond., Dub. Spirit of Spearmint.*

This is prepared by the *London* and *Dublin Colleges* from the oil of spearmint, in the manner directed by the two Colleges respectively for the preparation of the spirit of peppermint. The two spirits are used for the same purposes, in the dose of from thirty drops to a fluidrachm. W.

SPIRITUS MYRISTICÆ. *U.S., Lond.* SPIRITUS MYRISTICÆ MOSCHATÆ. *Ed.* SPIRITUS NUCIS MOSCHATÆ. *Dub. Spirit of Nutmeg.*

"Take of Nutmeg, bruised, *two ounces;* Diluted Alcohol [Proof Spirit, *Lond., Dub.*] *a gallon;* Water *sufficient to prevent empyreuma.* Macerate for twenty-four hours; then, with a slow fire, distil a gallon." *U.S., Lond., Dub.*

This spirit is prepared by the *Edinburgh College* from two ounces of bruised nutmeg, according to their general directions. (See page 977.)

The spirit of nutmeg is used chiefly for its flavour, as an addition to other medicines. The dose is one or two fluidrachms. W.

SPIRITUS PIMENTÆ. *U.S., Lond., Dub.* SPIRITUS MYRTI PIMENTÆ. *Ed. Spirit of Pimento.*

"Take of Pimento, bruised, *two ounces;* Diluted Alcohol [Proof Spirit, *Lond.*] *a gallon;* Water *sufficient to prevent empyreuma.* Macerate for twenty-four hours; then, with a slow fire, distil a gallon." *U.S., Lond.*

The *Dublin College* directs three ounces of pimento; in other respects its process is the same with the above.

The *Edinburgh College* prepares it from half a pound of bruised pimento, according to their general directions. (See page 977.)

This preparation may be used for the general purposes of the aromatic spirits, in the dose of one or two fluidrachms. W.

SPIRITUS PULEGII. *Lond., Dub. Spirit of European Pennyroyal.*

This is prepared by the *London College* from seven scruples *by weight* of the oil of pennyroyal, in the manner directed by the same College for the preparation of spirit of peppermint. The *Dublin College* prepares it by distilling together six scruples of the oil and a gallon of proof spirit. It is never used in this country. W.

SPIRITUS ROSMARINI. *U.S., Lond.* SPIRITUS RORISMARINI OFFICINALIS. *Ed.* SPIRITUS RORISMARINI. *Dub. Spirit of Rosemary.*

"Take of Oil of Rosemary [by weight] *an ounce;* Alcohol [Rectified Spirit, *Lond.*] *a gallon.* Add the Alcohol to the Oil, and pour on them so much water, that, after the distillation, sufficient may remain to prevent empyreuma; then, with a slow fire, distil a gallon." *U. S., Lond.*

The *Edinburgh College* takes two pounds of fresh rosemary tops and eight pounds of alcohol; and distils seven pounds by means of a water-bath.

The *Dublin College* employs a pound and a half of the fresh tops and a gallon of proof spirit, and distils five pounds with a moderate heat. This College also prepares the spirit by distilling together six scruples of the oil, and a gallon of proof spirit.

Spirit of rosemary is a grateful perfume, and is used chiefly as an ingredient in lotions or liniments.

Off. Prep. Linimentum Saponis Compositum, *Lond.*, *Dub.;* Spiritus Lavandulæ Compositus, *U.S.*, *Lond.*, *Ed.*, *Dub.* W.

SPONGIA.

Preparations of Sponge.

SPONGIA USTA. *U.S.*, *Lond.* Pulvis Spongiæ Ustæ. *Dub.* *Burnt Sponge.*

"Take of Sponge *any quantity.* Cut it into pieces, and beat it, that any extraneous adherent matters may be separated; then burn it in a close iron vessel until it becomes black and friable; lastly, rub it into a very fine powder." *U.S.*

The *London* and *Dublin* processes do not materially differ from the above.

The sponge is decomposed, the volatile matters being driven off by the heat, and a black friable coal remaining, which consists of charcoal mixed with phosphate and carbonate of lime, chloride of sodium, carbonate of soda, and iodine in the state of iodide of sodium. As the remediate value of burnt sponge depends chiefly upon the presence of iodine, it cannot be esteemed good unless it afford purple fumes when acted on by sulphuric acid assisted by heat. It is said that the preparation is most efficient as a remedy when the sponge is kept on the fire no longer than is necessary to render it friable. The powder is then of a much lighter colour. Guibourt recommends that the sponge selected for burning should be unwashed, of a strong odour, firm, and compact, that it should be put into a roaster similar to that sometimes used for coffee, and heated over a moderate fire till it becomes of a blackish-brown colour, that it should then be removed, powdered, and enclosed in a well stopped glass bottle. It is best when recently prepared, as the iodine is dissipated by time, and the specimens at first richest in this principle, contain little of it at the end of a year. (*Journ. de Chim. Med.*, *Dec.* 1831.)

Burnt sponge has been highly recommended in goitre, glandular swellings of a scrofulous character, and obstinate cutaneous eruptions. It is most conveniently administered mixed with syrup or honey, in the form of an electuary, with the addition of some aromatic, as powdered cinnamon. The dose is from one to three drachms. W.

STANNUM.

Preparations of Tin.

PULVIS STANNI. *U.S.* Stanni Pulvis. *Ed.*, *Dub.* *Powder of Tin.*

"Take of Tin *any quantity.* Melt it in an iron vessel over the fire, and, while it is cooling, stir it until it is reduced to a powder, which is to be passed through a sieve." *U.S.*

"Take of very pure Tin *any quantity.* Having melted it over the fire, agitate it strongly while congealing, so that it may be converted into a powder, which, when cold, is to be passed through a sieve." *Dub.*

The *Edinburgh College* has no formula for powdered tin, but includes it in the list of the Materia Medica.

Tin, being a very fusible metal, is easily granulated by fusion and subsequent agitation when in the act of congealing. The process is most conveniently performed, on a small scale, in a wooden box, the inside of which has been well rubbed with chalk. This may be afterwards washed away by water; and as the granulated powder is of unequal degrees of fineness, the coarser particles require to be separated by a sieve. For the properties of this metal see *Stannum.*

Medical Properties and Uses. Powder of tin is used exclusively as an anthelmintic, and is supposed to act by its mechanical properties. It is considered particularly adapted to the expulsion of the worm called *Ascaris lumbricoides*, and is sometimes employed to expel the tape worm; though for the latter purpose, oil of turpentine has proved more efficacious. For internal exhibition it ought always to be free from oxidation. The dose usually given is from one to two drachms, mixed with molasses, for several successive mornings, and then followed by a brisk cathartic. Dr. Alston, however, recommends much larger doses for the expulsion of tape worm. He begins by giving an ounce on an empty stomach, which is followed for two successive days with half an ounce each day, and finally by a brisk cathartic. B.

STYRAX.

Preparations of Storax.

STYRAX PURIFICATA. *U.S., Lond.* *Purified Storax.*

"Take of Storax, Alcohol, each, *a sufficient quantity.* Dissolve the Storax in the Alcohol, and strain the solution; then distil the Alcohol with a gentle heat, till the Storax acquires a proper consistence." *U.S.*

The purification of storax is directed by the *London College* in a similar manner.

Storax, as found in the shops, is usually so much adulterated as to render its purification necessary, before it can be applied to the purposes for which it is officinally directed. As it is wholly soluble in alcohol, and little of its active matter is driven off at the boiling point of that fluid, there can be no chemical objection to the above process. Another method, sometimes followed, is to express between heated iron plates the balsam from the foreign matters with which it is associated; but if the process be not very carefully conducted, the heat employed to melt the storax will be sufficient to dissipate a portion of the benzoic acid, which is one of its essential ingredients.

Off. Prep. Tinctura Benzoini Composita, *U.S.* W.

SULPHUR.

Preparations of Sulphur.

SULPHUR PRÆCIPITATUM. *U.S., Lond.* *Precipitated Sulphur.* *Milk of Sulphur.*

"Take of Sulphur [sublimed and washed] *a pound;* Lime, fresh burnt, *two pounds;* Muriatic Acid *a sufficient quantity;* Water *four gallons.* Boil the Sulphur and Lime together in the Water; then filter the solution through paper, and drop into it sufficient Muriatic Acid to precipitate the Sulphur. Lastly, wash the precipitate repeatedly with water till it becomes tasteless." *U.S.*

The *London* formula is essentially the same with the above, which was copied from it with a slight variation in the enumeration of the materials, to accommodate it to the plan of our Pharmacopœia.

In this process, water is decomposed, and its elements, by combining with separate portions of sulphur, give rise to bisulphuretted hydrogen and hyposulphurous acid, which, uniting to the lime, form a sulphuretted hydrosulphate and hyposulphite of lime. When muriatic acid is added to the filtered solution, muriate of lime is formed, a slight disengagement of sulphuretted hydrogen takes place, and sulphur is precipitated in the state constituting the preparation under consideration. The chief source of the precipitated sulphur is undoubtedly the excess present in the sulphuretted hydrosulphate; but it may be deemed probable, since sulphuretted hydrogen is but slightly disengaged, that the hydrosulphuric and hyposulphurous acids, upon being set free by the muriatic acid, react on each other, so as to form water and a fresh portion of sulphur. A simpler way of explaining the process, is to suppose that the lime unites directly with the sulphur, so as to form a sulphuret of lime in solution, a compound for which we have analogies in the existence of the chlorides of lime and soda. Assuming this to be the nature of the solution, the muriatic acid merely combines with the lime and precipitates the sulphur. This acid is the most eligible precipitant for the sulphur, as it forms with lime a very soluble salt, which is easily washed away. Sulphuric acid is altogether inadmissible for the purpose; as it forms an insoluble salt with lime, which becomes necessarily intermingled with the sulphur.

Properties, &c. Precipitated sulphur is in the form of white friable lumps of a pale yellowish-green tint, consisting of smooth, finely divided particles, slightly cohering together and devoid of taste, but possessing, when recently prepared, a peculiar smell. From its colour it was formerly called *lac sulphuris.* It is insoluble in water, but dissolves in a boiling solution of caustic potassa. When of a brilliant white colour, the presence of sulphate of lime may be suspected, in which case the sulphur will not be totally volatilized by heat. We have seen a sample of so-called precipitated sulphur, which consisted almost entirely of sulphate of lime. It differs from sublimed sulphur, in being in a state of more minute division, and, after being melted, in presenting a softer and less brittle mass. Its peculiarities probably depend upon the presence of water, which, however, is in too small a quantity to constitute a regular *hydrate*, as it is sometimes supposed to be.

Medical Properties and Uses. Precipitated sulphur possesses the same medical properties with sublimed sulphur, but is preferred by some practitioners on account of its smoothness and freedom from colour. Its state of extreme division renders it more readily suspended in liquids than sublimed sulphur; and its mode of preparation ensures it against the presence of acidity. It is sometimes selected for forming ointments, which have the advantage of appearance, in being of a lighter colour than when made of sublimed sulphur. The dose is from two to three drachms. (See *Sulphur.*)

B.

OLEUM SULPHURATUM. *Lond., Ed.* *Sulphurated Oil.*

"Take of Washed Sulphur *two ounces;* Olive Oil *a pint.* To the Oil previously heated in a very large iron vessel, gradually add the Sulphur, and stir them constantly with a spatula till they unite." *Lond.*

"Take of Olive Oil *eight parts;* Sublimed Sulphur *one part.* Boil them together, with a gentle fire, in a large iron pot, stirring them constantly till they unite." *Ed.*

The iron pot should be sufficiently large to hold three times the quantity of the materials employed, as the mixture might otherwise boil over. As the vapours which rise are apt to take fire, a lid should be at hand, to cover the pot, and thus extinguish the flame, should the accident take place. Sulphur is soluble to a considerable extent in heated oil, from which, if the solution be saturated, it is deposited in the crystalline state on cooling. But it is not a mere solution which this process is intended to effect. The oil is partly decomposed, and the resulting preparation is an extremely fetid, acrid, viscid, reddish-brown fluid, formerly known by the name of *balsam of sulphur.* In order that it may be obtained, the oil must be heated to the boiling point.

Sulphurated oil was formerly thought useful in chronic catarrh, consumption, and other pectoral complaints; but inconvenience has arisen from its acrid and irritating properties, and its internal use has been abandoned. It is said to be sometimes applied as a stimulant to foul ulcers. The dose is from five to thirty drops. W.

* * *

SYRUPI.

Syrups.

Syrups are concentrated solutions of sugar in watery fluids, either with or without medicinal impregnation. When the solution is made with pure water, it is named *syrup* or *simple syrup*, when with water charged with one or more medicinal agents, it is called in general terms a *medicated syrup*, and receives its particular designation from the substance or substances added.

Medicated syrups are prepared by incorporating sugar with vegetable infusions, decoctions, expressed juices, fermented liquids, or simple aqueous solutions. When the active matter of the vegetable is not readily soluble in water, or is volatilized or decomposed by a heat of 212°, it is sometimes extracted by diluted alcohol, the spirituous ingredient of which is subsequently driven off. Medicated syrups are also occasionally prepared by adding a tincture to simple syrup and evaporating the alcohol.

The quality and quantity of the sugar employed are points of importance. Refined sugar should always be preferred, as it often saves the necessity of clarification, and makes a clearer and better flavoured syrup than the impure kinds. The U.S. Pharmacopœia simply directs sugar, but explains that it is the purified or refined sugar which is indicated by that term. In relation to the quantity of sugar, if in too small proportion, fermentation is apt to occur, if too abundant, crystallization. The proper proportion is about two parts to one of the liquid. A somewhat smaller quantity will answer where acids, such as lemon juice or vinegar, are used.

As it is desirable, in many instances, that the active matters should be in as concentrated a state as possible in the syrup, it is often necessary to evaporate a large proportion of the watery fluid in which they are dissolved. This may be done either before the addition of the sugar or afterwards. In either case, care is requisite not to employ a heat too great or too long continued, lest the active principles should be injured. When these are very volatile or easily decomposed by heat, it is necessary to dispense with concentration altogether. Some substances which are volatilized or decomposed at the temperature of boiling water, remain fixed and unaltered at that which is necessary for the evaporation of alcohol. These, as before observed, may be dissolved in diluted alcohol, and the concentration effected by evaporating the spirituous part of the solvent. Independently of the injury which the medicinal ingredient of the syrup may sustain, the syrup itself is apt to become brown by a long continued application of heat, even when the degree is not excessive. It is recommended, therefore, that syrups which admit of concentration, should be boiled briskly over a lively fire, so as to accomplish the object as quickly as possible. It is important to be able to ascertain positively when they have attained the due consistence. An operator skilled in their preparation can judge with sufficient accuracy by various familiar signs;—such as the slowness with which the parts of a drop of syrup coalesce when previously separated by the edge of a blunt instrument; and the receding of the last portion of each drop, when the syrup, after being cooled, is poured out drop by drop. A pellicle forming upon the surface of the syrup when it cools, indicates that it has been too much boiled. But these signs are not to be relied on except by those who have acquired much experience. The easiest method of ascertaining the proper point of concentration is by the use of Baumé's hydrometer. This should stand at 30° in boiling syrup (30½ in hot weather), and at 35° in the syrup when it is cool. Another very accurate though less ready method is to ascertain the sp. gr. by weighing a portion of the liquid. Syrup when boiling should have a sp. gr. of about 1.261—when cold, about 1.319. Thomson and Duncan are mistaken in giving the proper sp. gr. of cold syrup as 1.385. We found that of a specimen of simple syrup made with two pounds and a half of sugar to a pint of water, to be 1.326 at 68° F.; and this consistence is rather too great for practical convenience in cold weather. A third method of ascertaining the proper point of concentration is by the thermometer, which, in boiling syrup of the proper consistence, stands at 221° F. This indication is founded on the fact, that the boiling point of syrup rises in proportion to the increase of its density.

When carefully prepared with double refined sugar, syrups generally require no other clarification than to remove any scum which may rise to their surface upon standing, and to pour them off from any dregs which may subside. Should they, however, want the due degree of clearness, they may be filtered through flannel, or, when not likely to be injured by the treatment, may be clarified by means of the white of eggs or animal charcoal, as mentioned under the head of *Syrupus*.

The medicated syrups are liable to undergo various alterations according to their nature and mode of preparation. The acid syrups, when too much boiled, often let fall a copious white precipitate, which is said to be a saccharine matter analogous to the sugar of grapes, produced by the reaction of the acid upon the sugar. Those which contain too little sugar are apt to pass into the vinous fermentation, in consequence of the presence of matters which act as a ferment. Those which contain too much, deposite a portion in the crystalline state, and the crystals, attracting the sugar remaining in solution, gradually weaken the syrup, and render it liable to the same change as when originally made with too little sugar. The want of a due proportion of saccharine matter frequently also gives rise to mouldiness, when air has access to the syrup. It is said that syrups, enclosed, while they are still hot, in bottles, are apt to ferment, because the watery vapour, rising to the surface and there condensing, diminishes the proportion of sugar, so as to produce a commencement of chemical action, which gradually extends through the whole mass. When syrups undergo the vinous fermentation, they become covered at the surface with froth, produced by the disengagement of carbonic acid, and acquire a vinous odour from the presence of alcohol; while their consistence is diminished by the loss of a portion of the sugar which has been converted into that liquid. When the quantity of alcohol has increased to a certain point, the fermentation ceases or goes on more slowly, owing to the preservative influence of this principle; and as the active ingredient of the syrup has frequently undergone no material change, the preparation may often be recovered by boiling so as to drive off the alcohol and carbonic acid, and concentrate the liquid sufficiently. A syrup thus revived is less liable afterwards to undergo change, because the principles which acted as ferments have been diminished or consumed. It is obvious that syrups which depend for their virtues upon a volatile ingredient, or one readily changeable by heat, cannot be restored to their original condition.

At best, syrups are too apt to change, and various measures have been proposed for their preservation. According to Dr. Macculloch, the addition of a little sulphate of potassa, or of chlorate of potassa, which is a tasteless salt, prevents their fermentation. M. Chereau has found the sugar of milk effectual to the same end, in the instance of the syrup of poppies; and it may prove useful in others. The proportion which he employs is 32 parts of the sugar of milk to 1000 of the syrup. But the best plan is to make small quantities at a time, and to keep them, unless when wanted for immediate use, in bottles quite full and well stopped, which should be put in the cellar or other cool place. The *London College* directs that "syrups be kept in a place where the temperature never exceeds 55°." It would be difficult to comply with such a rule in this country.

In relation to the preparation of syrups, the *Dublin College* gives the following general directions. "When no mention is made of the weight of sugar or the mode of dissolving it, syrups are to be prepared according to the following rule. Take of Refined Sugar, in fine powder, *twenty nine ounces;* the Liquor prescribed *a pint.* Add the Sugar by degrees, and digest it with a medium heat [from 100° to 200° F.] in a covered vessel, frequently shaking, till it is dissolved; then set aside the solution for twenty-four hours; remove the scum, and pour off the syrup from the dregs if there be any." W.

SYRUPUS. *U.S.* SYRUPUS SIMPLEX. *Lond., Ed., Dub.* *Syrup. Simple Syrup.*

"Take of Sugar [refined] *two pounds and a half;* Water *a pint.* Dissolve the Sugar in the Water by means of a water-bath, and set the solution aside for twenty-four hours; then remove the scum, and if there be any dregs, pour off the clear solution from them." *U.S., Lond.*

"Take of Refined Sugar *fifteen parts;* Water *eight parts.* Dissolve the Sugar in the Water by a gentle heat, and boil a little so as to form a syrup." *Ed.*

"Take of Refined Sugar, finely powdered, *twenty-nine ounces;* Water *a pint.* Add the Sugar gradually to the Water, and digest it with a medium heat [from 100° to 200° F.] in a close vessel till it is dissolved, frequently stirring; afterwards pour off from the dregs if there be any." *Dub.*

This syrup, when properly prepared, is inodorous, of a sweet taste without peculiar flavour, thick, viscid, nearly colourless, and perfectly transparent. If somewhat turbid, as it is apt to be when made with sugar not well refined, it may be clarified by beating the white of an egg to a froth with three or four ounces of water, mixing this with the syrup, boiling the mixture for a short time that the albumen may coagulate, and taking off the scum which rises to the surface, or separating it by filtration through paper or flannel. Two gallons of the syrup may be thus clarified. Any colour and peculiar flavour which it may possess, may be removed by treating it at the same time with a small proportion (about 5 per cent.) of animal charcoal.

Syrup is very useful in the formation of pills and mixtures, and in various other pharmaceutical operations in which sugar in solution is required.

Off. Prep. Confectio Opii, *U.S.*, *Lond.*, *Dub.;* Infusum Acaciæ Catechu, *Ed.;* Syrupus Balsami Tolutani, *Dub.*, *Ed.;* Syrupus Rhei Aromaticus, *U.S.;* Syrupus Zingiberis, *U.S.;* Trochisci Glycyrrhizæ et Opii, *U.S.*, *Ed.* W.

SYRUPUS ACACIÆ. *U.S.* *Syrup of Gum Arabic.*

"Take of Gum Arabic *four ounces;* Sugar [refined] *a pound;* Boiling Water *a pint.* Dissolve the Gum in the water; then add the Sugar, and boil so as to form a syrup." *U.S.*

This is a very convenient addition to pectoral and other mixtures in which the aid of gum Arabic and sugar is required, either to suspend insoluble substances, or to impart demulcent properties. It may be clarified if necessary in the same manner as simple syrup. W.

SYRUPUS ACETI. *U.S.*, *Ed.* *Syrup of Vinegar.*

"Take of Vinegar *a pint;* Sugar [refined] *two pounds.* Dissolve the Sugar in the Vinegar in the manner directed for Syrup." *U.S.*

The *Edinburgh College* takes five parts of vinegar, and seven of refined sugar, and boils them so as to form a syrup.

Syrup of vinegar forms with water a refrigerant and grateful drink in febrile complaints. It may be added to barley water and other farinaceous and mucilaginous beverages and mixtures, when a vegetable acid is not contra-indicated. W.

SYRUPUS ALLII. *U.S.* *Syrup of Garlic.*

"Take of fresh Garlic, sliced, *two ounces;* Distilled Vinegar *a pint;* Sugar [refined] *two pounds.* Macerate the Garlic in the Vinegar, in a glass vessel, for four days; then express the liquor, and set it by that the dregs may subside; lastly, dissolve the Sugar in the clear liquor in the manner directed for Syrup. *U.S.*

This preparation is made upon correct principles, as vinegar is a much better solvent of the active matter of garlic than water; but the proportion of the garlic might be increased with advantage to three times the amount indicated in the formula. The syrup is given in chronic catarrhal affections of the lungs, and is particularly beneficial in infantile cases, by the stimulus which it affords to the nervous system. A teaspoonful may be given for a dose to a child a year old. W.

SYRUPUS ALTHÆÆ. *Lond.*, *Dub.* SYRUPUS ALTHÆÆ OFFICINALIS. *Ed.* *Syrup of Marshmallow.*

"Take of fresh Marshmallow Root, bruised, *half a pound;* Refined Sugar *two pounds;* Water *four pints.* Boil down the Water with the Root to one half, and express the liquor when cool. Set it by for twenty-four hours that the dregs may subside; then pour off the liquor, and having added the Sugar, boil down to the proper consistence." *Lond.*, *Dub.*

The *Edinburgh College* takes one part of the root, ten parts of water, and four parts of sugar, and proceeds as above.

This syrup contains a considerable quantity of starch, besides mucilage, and is very liable to ferment. It is simply demulcent; but is inferior to the mucilage of gum Arabic, and in this country is very seldom prepared. W.

SYRUPUS AURANTII CORTICIS. *U.S.* SYRUPUS AURANTIORUM. *Lond.* SYRUPUS CITRI AURANTII. *Ed.* SYRUPUS AURANTII. *Dub.* *Syrup of Orange Peel.*

"Take of Orange Peel, bruised, *two ounces;* Boiling Water, *a pint;* Sugar [refined] *two pounds and a half.* Macerate the Orange Peel in the Water, in a covered vessel, for twelve hours, and strain; then add the Sugar, and form a syrup with a gentle heat." *U.S.*

The British Colleges direct the fresh peel of Seville oranges. The process of the *London College* agrees with the above, except that three pounds of refined sugar are directed, and its solution effected without heat. The *Edinburgh College* orders three ounces of the peel, a pound and a half of boiling water, and three pounds of refined sugar, proceeding as directed in the U.S. Pharmacopœia. The *Dublin College* employs eight ounces of the peel, six pints of boiling water, and the quantity of sugar indicated in its general directions (page 986); and dissolves the sugar without heat.

In the preparation of this syrup, the solution of the sugar in the infusion of orange peel should be effected with as little heat as possible, in consequence of the volatile nature of the active principle of the peel; and, to facilitate the solution, the sugar should be previously powdered.

The syrup has a pleasant flavour, for which alone it is employed. A fluidounce of the tincture of orange peel added to a pint of simple syrup, affords a preparation little inferior to the officinal, though the presence of the spirit may in some instances be objectionable.

Off. Prep. Confectio Aromatica, *U.S., Ed.;* Confectio Scammonii, *U.S.;* Electuarium Cassiæ, *Dub.* W.

SYRUPUS COLCHICI. *U.S.* SYRUPUS COLCHICI AUTUMNALIS. *Ed.* *Syrup of Meadow-saffron.*

"Take of Vinegar of Meadow-saffron *a pint;* Sugar [refined] *two pounds.* Dissolve the Sugar in the Vinegar of Meadow-saffron in the manner directed for Syrup." *U.S.*

"Take of fresh Meadow-saffron Root, cut into thin slices, *an ounce;* Vinegar *sixteen ounces;* Refined Sugar *twenty-six ounces.* Macerate the Root in the Vinegar for two days, occasionally shaking the vessel; then strain with gentle expression, and having added the Sugar, boil a little so as to form a syrup." *Ed.*

This preparation is much inferior to the wine of colchicum, and is very seldom used. The dose is from a fluidrachm to half a fluidounce, or more. W.

SYRUPUS CROCI. *Lond.* *Syrup of Saffron.*

"Take of saffron *an ounce;* Boiling Water *a pint;* Refined Sugar *two pounds and a half.* Macerate the Saffron in the Water for twelve hours, in a lightly covered vessel; then strain the Liquor, and add the Sugar." *Lond.*

This is slightly stimulant, but is valued chiefly for its fine colour.

SYRUPUS DIANTHI CARYOPHYLLI. *Ed.* *Syrup of the Clove Pink.*

"Take of the fresh Petals of the Clove Pink, freed from their claws, *one* *part;* Boiling Water *four parts;* Refined Sugar *seven parts.* Macerate the Petals in the Water for twelve hours; then add the Sugar to the filtered liquor, and dissolve it with a gentle heat so as to form a syrup." *Ed.*

The only value of this preparation consists in its beautiful red colour, and agreeable flavour. A syrup closely resembling it in these respects, is sometimes prepared from an infusion of cloves and sugar, with the addition of a little cochineal. The genuine syrup may be distinguished by the effect of alkalies, which change its colour to green, while they only vary the shade of red in the counterfeit. Neither of them is much used in this country. W.

SYRUPUS LIMONIS. *U.S., Dub.* SYRUPUS LIMONUM. *Lond.* SYRUPUS CITRI MEDICÆ. *Ed.* *Lemon Syrup.*

"Take of Juice of Lemons, strained, *a pint;* Sugar [refined] *two pounds.* Dissolve the Sugar in the Juice in the manner directed for Syrup." *U.S. Lond.*

"Take of Juice of Lemons, strained after the dregs have subsided, *three parts*; Refined Sugar *five parts.* Dissolve the Sugar," *Ed.*

"Take of Juice of fresh Lemons *two pints.* As soon as the dregs have subsided, put the Juice into a matrass, and subject it for fifteen minutes to the heat of boiling water. When cold, strain it through a sieve, and form a syrup." *Dub.*

This syrup forms a cooling and grateful addition to beverages in febrile complaints, and serves to conceal the taste of saline purgatives given in solution. W.

SYRUPUS MORI. *Lond.* *Syrup of Mulberries.*

"Take of Mulberry Juice, strained, *a pint;* Refined Sugar *two pounds.* Dissolve the Sugar in the Mulberry Juice in the manner directed for Simple Syrup." *Lond.*

This may be used for the same purposes with lemon syrup. In like manner syrups may be prepared from various succulent fruits, such as *strawberries, raspberries, pineapples,* &c. When the juice is thick, it may be diluted with from one-third of its bulk to an equal bulk of water, previously to the addition of the sugar. In the preparation of *raspberry syrup*, which, as ordinarily made, is apt to gelatinize, M. Blondeau recommends that the strained juice be allowed to stand from eight to fifteen hours, according to the temperature, in order to ferment. The juice separates into two portions, the upper thick, the lower clear. The latter is to be separated by straining and made into a syrup with the usual proportion of sugar. These syrups are employed to flavour drinks, and are much used as grateful additions to carbonic acid water. W.

SYRUPUS PAPAVERIS. *Lond.* SYRUPUS PAPAVERIS SOMNIFERI. *Ed., Dub.* *Syrup of Poppies.*

"Take of the dried Capsules of the White Poppy, bruised and freed from the seeds, *fourteen ounces;* Refined Sugar *two pounds;* Boiling Water *two gallons and a half.* Macerate the Capsules in the Water for twenty-four hours; then by means of a water-bath, boil down to a gallon, and express strongly. Boil down the strained liquor again to two pints, and strain it while hot. Set it by for twelve hours that the dregs may subside, then boil down the clear liquor to a pint, and add the sugar in the manner directed for Simple Syrup." *Lond.*

"Take of the Capsules of the White Poppy, dried and freed from their seeds, *one part;* Boiling Water *fifteen parts;* Refined Sugar *two parts.* Macerate the sliced Capsules in the water for twelve hours; then boil till only one-third of the liqour remains, and strain the decoction with strong expression. Boil the strained liquor to one-half, and again strain; lastly, add the Sugar and boil a little so as to form a syrup." *Ed.*

"Take of the Capsules of the White Poppy, dried, deprived of their seeds, and bruised, *seventeen ounces*; Boiling Water *two gallons*. Macerate the Capsules in the Water for twenty-four hours; then, by means of a water-bath, boil down to a gallon, and strongly express. Boil down the strained liquor again to two pints, and strain it while hot. Set it by for twelve hours that the dregs may subside; then boil down the clear liquor to a pint, and form a syrup." *Dub.*

The use of the water-bath in preparing this syrup, as directed by the London and Dublin Colleges, is superfluous, and delays the process. As the capsules contain variable proportions of the narcotic principle, the syrup prepared from them is necessarily of variable strength. It is, moreover, very apt to spoil. Its place might with great propriety, be supplied by a syrup prepared from one of the salts of morphia, which would keep well and have the advantage of uniform strength. Four grains of the sulphate of morphia dissolved in a pint of syrup, would afford a preparation at least equal to the average strength of the syrup of poppies, and much more certain in its operation.

The syrup of poppies is employed, chiefly in infantile cases, to allay cough, quiet restlessness, relieve pain, and promote sleep. The dose is from half a fluidrachm to a fluidrachm for an infant, from half a fluidounce to a fluidounce for an adult. W.

SYRUPUS RHAMNI. *Lond., Dub.* *Syrup of Buckthorn.*

"Take of the fresh Juice of Buckthorn Berries *four pints;* Ginger Root, sliced, Pimento Berries, in powder, each, *half an ounce;* Refined Sugar *three pounds and a half.* Set by the Juice for three days that the dregs may subside, and then strain it. To a pint of the clear Juice add the Ginger and Pimento; then macerate for four hours with a gentle heat, and strain. Boil down the remainder of the Juice to a pint and a half; mix the liquors, and add the Sugar in the manner directed for Simple Syrup." *Lond.*

Take of the fresh Juice of Buckthorn Berries *two pints and a half;* Ginger Root, sliced, Pimento Berries, in powder, each, *three drachms.* Set by the Juice that the dregs may subside, and then strain it. Add the Ginger and Pimento to ten ounces of the clear Juice, macerate for twenty-four hours, and filter. Boil down the remaining Juice to a pint, mix the liquors, and form a syrup." *Dub.*

The syrup of buckthorn is a brisk cathartic, but having an unpleasant taste, and being apt to gripe violently, is very seldom employed. The dose is from half a fluidounce to a fluidounce. The patient should drink freely of thin gruel or other demulcent beverage during its operation. W.

SYRUPUS RHEI. *U.S.* *Syrup of Rhubarb.*

"Take of Rhubarb, bruised, *two ounces;* Boiling Water *a pint;* Sugar [refined] *two pounds.* Macerate the Rhubarb in the Water for twenty-four hours, and strain; then add the Sugar, and boil for a short time so as to form a syrup." *U.S.*

This is a mild cathartic, adapted to the cases of infants, to whom it may be given in the dose of one or two fluidrachms.

It has been proposed to form the *syrup* of rhubarb in the manner directed in the U.S. Pharmacopœia for the *aromatic syrup*, by first preparing a tincture with diluted alcohol, then evaporating the spirituous portion by means of a water-bath, and incorporating the remainder with sugar. It is questionable, however, whether this would be an improvement on the officinal formula; as, though a stronger syrup might be obtained, there would be some risk that a portion of the alcohol might remain, and render the preparation too stimulating to meet the indication for which it was originally intended. W.

SYRUPUS RHEI AROMATICUS *U.S.* *Aromatic Syrup of Rhubarb.*

"Take of Rhubarb, bruised, *two ounces and a half;* Cloves, bruised, Cinnamon, bruised, each, *half an ounce;* Nutmeg, bruised, *two drachms;* Diluted Alcohol *two pints;* Syrup *six pints.* Macerate the Rhubarb and aromatics in the Diluted Alcohol for fourteen days, and strain; then, by means of a water-bath, evaporate the liquor to a pint, and while it is still hot, mix it with the syrup previously heated." *U.S.*

This process is a decided improvement upon that of the first edition of the U.S. Pharmacopœia, in which the rhubarb and spices were boiled long in water, and sugar and alcohol afterwards added to the strained decoction. The oils of the aromatics were thus driven off and wasted, water being able to take up but a small proportion; while the preparation was rendered too stimulant by the spirituous addition. By the present process the alcohol employed in the maceration, after having performed its office of extracting the virtues of the medicines, is evaporated at a temperature insufficient for the volatilization of the oils, and a syrup is obtained at least as strong as that of the old Pharmacopœia, with less waste of materials, and without the objectionable presence of a large proportion of spirit.

As the original formula had been in general use, and practitioners were accustomed to the preparation, it was thought advisable that the present should have as nearly as possible the same strength; otherwise the proportion both of rhubarb and of spices might have been with geat propriety augmented. The apothecary should be careful to employ aromatics of the best quality, and to effect the evaporation of the tincture, according to the officinal direction, by means of a water-bath.

The aromatic syrup of rhubarb is a warm stomachic laxative, too feeble for adult cases, but well calculated for the bowel complaints of infants, which are so frequent in our cities during the summer season, and as a remedy for which the preparation has been long in use under the name of *spiced syrup of rhubarb.* The dose for an infant with diarrhœa is a fluidrachm, repeated every two hours till the passages indicate by their colour that the medicine has operated. W.

SYRUPUS RHEI ET SENNÆ. *U.S.* *Syrup of Rhubarb and Senna.*

"Take of Rhubarb, bruised, Senna, each, *an ounce and a half;* Cardamom, bruised, *three drachms;* Boiling Water *a pint;* Sugar *two pounds.* Macerate the Rhubarb, Senna, and Cardamom in the Water, in a covered vessel, for twenty-four hours, and strain; then add the Sugar, and boil for a short time so as to form a syrup." *U.S.*

In the process of the former edition of the U. S. Pharmacopœia, the infusion was injudiciously boiled down to one-half before the addition of the sugar, so that the virtues of the senna were necessarily impaired, while the oil of the cardamom was in great measure driven off. In the present process this error is avoided. The syrup of rhubarb and senna is more active than the simple syrup of rhubarb, and may be used as a gentle tonic cathartic in the complaints both of children and adults. The dose for the former is a fluidrachm, for the latter, a fluidounce. W.

SYRUPUS RHŒADOS. *Lond.* SYRUPUS PAPAVERIS RHŒADIS. *Dub.* *Syrup of Red Poppy.*

"Take of the fresh Petals of the Red Poppy *a pound;* Boiling Water *a pint and two fluidounces;* Refined Sugar *two pounds and a half.* To the Water heated by a water-bath, gradually add the Petals, occasionally stirring; then, having removed the vessel, macerate for twelve hours; express the liquor, and set it by that the dregs may subside; lastly, add the Sugar in the manner directed for Simple Syrup." *Lond.*

"Take of the fresh Petals of the Red Poppy *a pound;* Boiling Water *twenty fluidounces.* Add the Petals gradually to the boiling water; then, having removed the vessel from the fire, macerate with an inferior heat [between 90° and 100°] for twelve hours; express the liquor, and set it by that the dregs may subside; lastly, add the Sugar, and form a syrup." *Dub.*

The object of introducing the petals into water heated by a water-bath, is that they may shrink by being scalded, as otherwise they could not be completely immersed in the quantity of water directed. After this has been accomplished, they should be immediately removed from the fire, lest the liquor should become too thick and ropy. The fine red colour of this syrup is its only recommendation. It has no medical virtues, and is very liable to ferment. W.

SYRUPUS ROSÆ. *Lond., Dub.* SYRUPUS ROSÆ CENTIFOLIÆ. *Ed.* *Syrup of Roses.*

"Take of the dried Petals of the Hundred-leaved rose *seven ounces;* Refined Sugar *six pounds;* Boiling Water *four pints.* Macerate the Petals in the water for twelve hours and strain. Evaporate the strained liquor, by means of a water-bath, to two pints and a half; then add the Sugar in the manner directed for Simple Syrup." *Lond., Dub.*

"Take of the fresh Petals of the Hundred-leaved Rose, *one part;* Boiling Water *four parts;* Refined Sugar *three parts.* Macerate the Petals in the Water for twelve hours; then add the Sugar to the strained liquor, and boil so as to form a syrup." *Ed.*

This syrup is gently laxative, and, on account of its mildness, may be given with advantage to infants and persons of delicate habit. It is without the fragrance of the rose; but has a reddish colour which is rendered bright red by acids, and green or yellow by alkalies. The dose is from two fluidrachms to one or two fluidounces. W.

SYRUPUS ROSÆ GALLICÆ. *Ed.* *Syrup of Red Roses.*

"Take of the dried Petals of the Red Rose *one part;* Refined Sugar *two parts;* Boiling Water *nine parts.* Macerate the Petals in the Water for twelve hours; then boil a little and strain. Add the Sugar to the strained liquor, and again boil a little, so as to form a Syrup." *Ed.*

The syrup of red roses is mildly astringent; but is valued more for its fine red colour, on account of which it is occasionally added to mixtures.

Off. Prep. Electuarium Catechu Compositum, *Ed.* W.

SYRUPUS SARSAPARILLÆ. *U.S., Lond., Dub.* *Syrup of Sarsaparilla.*

"Take of Sarsaparilla, bruised, *two pounds;* Guaiacum Wood, rasped, *three ounces;* Red Roses, Senna, Liquorice Root, bruised, each, *two ounces;* Oil of Sassafras, Oil of Anise, each, *five minims;* Oil of Partridge-berry *three minims;* Sugar [refined] *eight pounds;* Diluted Alcohol *ten pints.* Macerate the Sarsaparilla, Guaiacum Wood, Roses, Senna, and Liquorice Root, in the Diluted Alcohol, for fourteen days; then express and filter through paper. Evaporate the tincture, by means of a water-bath, to four pints and a half; then add the Sugar, and dissolve it so as to form a syrup. With this when cold mix the oils previously triturated with a small quantity of the syrup. *U.S.*

The *London College* prepares the syrup of sarsaparilla by macerating a pound of the sliced root in a gallon of boiling water for twenty-four hours, then boiling down to four pints, straining the liquor while hot, adding a pound of refined sugar, and evaporating to the proper consistence.

The *Dublin College* obtains in the same manner four pints of a concentrated strained decoction, and prepares a syrup with this according to their general directions. (See page 986.)

The syrup of the London and Dublin Colleges is necessarily a very weak if not inert preparation, the virtues of the sarsaparilla being injured or destroyed by the long boiling. That of the U. S. Pharmacopœia is prepared on more correct principles, and is a great improvement upon the syrup of the former edition, which was intended to represent the famous French *sirop de Cuisinier*. The Pharmacopœia of 1820 directed the sarsaparilla to be exhausted by long continued decoction in water, and was indefinite as to the degree of concentration. Now it has been proved that diluted alcohol more thoroughly extracts the acrid principles of the root, upon which its activity probably depends, than water, and that these principles are either dissipated or destroyed by the long continued application of a boiling heat.* In the present formula, therefore, which employs diluted alcohol as the menstruum, the root is more completely exhausted of its active matter, while the heat applied to the concentration, being no higher than is requisite for the evaporation of the alcohol, is insufficient to injure the preparation. The spirituous menstruum has, moreover, the advantage of not dissolving the inert fecula, which encumbers the syrup prepared by decoction and renders it liable to spoil. The operator should be careful to comply exactly with the directions of the Pharmacopœia in relation to the period of maceration and the use of the water-bath. The essential oils being intended solely to communicate a pleasant flavour, are used in very small proportion. Perhaps the pale or hundred-leaved roses might be substituted with propriety for the red; as, being slightly laxative, they accord better with the character of the preparation, and are, besides, more easily procured of good quality. We are confident that a syrup prepared according to the officinal process will be found to possess the virtues of sarsaparilla in a high degree; but the practitioner should be aware that much of the root as it exists in the market is nearly or quite inert, and should be prepared to meet with disappointment in the use of this or any other preparation, unless satisfied of the good quality of the drug from which it is made.

The dose of the syrup of sarsaparilla is half a fluidounce, equivalent to somewhat less than a drachm of the root, to be taken three or four times a day. W.

SYRUPUS SCILLÆ. *U.S.* SYRUPUS SCILLÆ MARITIMÆ. *Ed.* *Syrup of Squill.*

"Take of Vinegar of Squill *a pint;* Sugar [refined] *two pounds.* Dissolve the Sugar in the Vinegar of Squill in the manner directed for Syrup." *U.S.*

The *Edinburgh College* takes four parts of the vinegar of squill and seven parts of refined sugar, in powder, and dissolves the sugar with a gentle heat so as to form a syrup.

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* See a paper by J. Hancock, M. D., republished in the *Journ. of the Phil. Col. of Pharm.* i. 295; a communication by M. Beral to the *Journal de Pharmacie*, xv. 657; and another by M. Soubeiran in the same Journal, xvi. 38.

This syrup is much employed as an expectorant, especially in combination with a solution of tartarized antimony. The dose is about a fluidrachm. In infantile cases of catarrh and other pectoral complaints, it is sometimes given, in the same dose, as an emetic. W.

SYRUPUS SENEGÆ. *U. S.* *Syrup of Seneka.*

"Take of Seneka, bruised, *four ounces;* Water *a pint;* Sugar [refined] *a pound.* Boil the Water with the Seneka to one-half, and strain; then add the Sugar, and boil so as to form a syrup." *U.S.*

The quantity of seneka is perhaps greater than the water is capable of exhausting; but an active preparation is ensured. The syrup may be given as a stimulant expectorant in the dose of one or two fluidrachms. W.

SYRUPUS SENNÆ. *Lond.* SYRUPUS CASSIÆ SENNÆ. *Ed.* *Syrup of Senna.*

"Take of Senna Leaves *two ounces;* Fennel Seeds, bruised, *an ounce;* Manna *three ounces;* Refined Sugar *a pound;* Boiling Water *a pint.* Macerate the Senna Leaves and Fennel Seeds in the Water with a gentle heat for an hour. Strain the liquor and mix with it the Manna and Sugar; then boil down to the proper consistence." *Lond.*

"Take of Senna Leaves *two ounces;* Boiling Water *a pound and a half;* Molasses *eight ounces.* Macerate the Leaves in the Water in a slightly covered vessel for four hours, and strain; then add the Molasses, and boil with a gentle heat to the consistence of a syrup." *Ed.*

The London syrup is preferable to the Edinburgh in consequence of the aromatic ingredient, though the manna which it contains is apt to crystallize. The preparation is intended chiefly as a cathartic for children, to whom it may be given in the dose of one or two fluidrachms. We prefer the Syrupus Rhei et Sennæ of the U.S. Pharmacopœia. W.

SYRUPUS TOLUTANUS. *Lond.* SYRUPUS TOLUIFERÆ BALSAMI. *Ed.* SYRUPUS BALSAMI TOLUTANI. *Dub.* *Syrup of Tolu.*

"Take of Balsam of Tolu *an ounce;* Boiling Water *a pint;* Refined Sugar *two pounds.* Boil the Balsam in the Water for half an hour, in a covered vessel, occasionally stirring, and strain the liquor when cold; then add the Sugar in the manner directed for Simple Syrup." *Lond.*

The *Edinburgh College* prepares this syrup by adding gradually one ounce of the tincture of balsam of tolu to two pounds of simple syrup just prepared, and before it has become cold after removal from the fire. The *Dublin College* pursues the same plan, using an ounce of the tincture to a pint and a half of syrup.

The London process affords a syrup with a finer flavour than that prepared with the tincture. The same portion of balsam is, according to Mr. Brande, usually employed in successive operations, and it long continues to impart odour and taste to boiling water. The syrup of tolu is wholly inert as a medicine, and is employed only to communicate its pleasant flavour to mixtures. W.

SYRUPUS VIOLÆ. *Dub.* SYRUPUS VIOLÆ ODORATÆ. *Ed.* *Syrup of Violets.*

"Take of the fresh Petals of the Violet *two pounds;* Boiling Water *five pints.* Macerate for twenty-four hours; then filter the liquor through fine linen, without expression; lastly, add the Sugar [twenty-nine ounces for every pint of liquor] and form a syrup." *Dub.*

"Take of fresh Violets *two parts;* Boiling Water *eight parts;* Refined Sugar *fifteen parts.* Macerate the Violets in the Water for twenty-four hours, in a covered glass or glazed earthenware vessel, then strain without expression, and add the Sugar." *Ed.*

This syrup has a deep blue colour and an agreeable flavour. It is said that its colour is most beautiful when it is prepared in well cleaned pewter vessels; but the action of the metal has not been satisfactorily explained. As it is apt to fade by time, it is sometimes counterfeited with materials the colour of which is more permanent. The fraud may usually be detected by the addition of an acid or alkali, the former of which reddens the syrup of violets, the latter renders it green, while they produce no such change upon the counterfeit.

The syrup acts as a gentle laxative when given to infants in the dose of one or two fluidrachms; but it is used chiefly as a test of acids and alkalies. For the latter purpose, a syrup prepared from the juice of the red cabbage may be substituted in its place. It is very seldom kept in our shops. W.

SYRUPUS ZINGIBERIS. *U. S., Lond., Dub.* SYRUPUS AMOMI ZINGIBERIS. *Ed.* *Syrup of Ginger.*

"Take of Tincture of Ginger *two fluidounces;* Syrup *a gallon.* Mix the Tincture with the Syrup, and by means of a water-bath evaporate the alcohol." *U. S.*

The *London College* macerates two ounces of sliced ginger, for four hours, in a pint of boiling water, and having strained the infusion, adds two pounds of refined sugar in the manner directed for simple syrup. The *Edinburgh College* macerates four ounces of bruised ginger, for twenty-four hours, in a pound of boiling water, strains, adds twenty-two ounces of refined sugar, and dissolves it with a gentle heat. The *Dublin College* macerates four ounces of the bruised root, for twenty-four hours, in three pints of boiling water, filters the liquor, and adds twenty-nine ounces of refined sugar to each pint.

The process of the U.S. Pharmacopœia is the most easy, and affords a syrup in every respect equal to the others, without being like them encumbered with the mucilage and starch of the root. In order that it may be of the proper strength, it is necessary that the tincture should have been made with the best Jamaica ginger.

The syrup of ginger is much used as a warm stomachic addition to tonic and purgative infusions or mixtures, and to impart flavour to drinks, particularly to carbonic acid water.

Off. Prep. Electuarium Catechu Compositum, *Dub;* Electuarium Opiatum, *Ed.* W.

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TINCTURÆ.

Tinctures.

Tinctures, in the pharmaceutical sense of the term, are solutions of medicinal substances in alcohol or diluted alcohol, prepared by maceration or digestion. Solutions in ammoniated alcohol and ethereal spirit are embraced under the same denomination, but are severally distinguished by the addition of an epithet expressive of their peculiar character. The advantages of alcohol as a menstruum are, that it dissolves principles which are sparingly or not at all soluble in water, and contributes to their preservation when dissolved. In no instance, however, is pure absolute alcohol employed. The United States, London, and Edinburgh Pharmacopœias, direct it of the sp. gr. 0.835, that of Dublin, of the sp. gr. 0.840. When of these densities it contains a considerable proportion of water, and is capable of dissolving more or less of substances which are insoluble in anhydrous alcohol, while its solvent power, in relation to bodies soluble in this fluid, is sufficient for all practical purposes. In numerous instances, diluted alcohol or proof spirit is preferable to alcohol itself; as it is capable of extracting a larger proportion of those active principles of plants which require an aqueous menstruum, at the same time that it is strong enough to prevent spontaneous decomposition, and has the advantages of being cheaper and less stimulating. The diluted alcohol of the different Pharmacopœias is not of the same strength, that of the United States and Edinburgh consisting of equal measures of officinal alcohol and water, and having the sp. gr. 0.935, while that of London has the sp. gr. 0.930, and that of Dublin 0.919. The difference, however, is not very material. Alcohol or rectified spirit is preferred as the solvent, when the substance to be extracted or dissolved is nearly or quite insoluble in water, as in the instances of the resins, guaiac, camphor, and the essential oils. The presence of water is here injurious, not only by diluting the menstruum, but by exercising an affinity for the alcohol which interferes with its solvent power. Thus water added to an alcoholic solution of one of these bodies, produces a precipitate by abstracting the alcohol from it. Diluted alcohol or proof spirit is employed, when the substance is soluble both in alcohol and water, or when one or more of the ingredients are soluble in the one fluid, and one or more in the other, as in the case of those vegetables which contain extractive or tannin, or the native salts of the organic alkalies, or gum united with resin or essential oil. As these include the greater number of medicines from which tinctures are prepared, diluted alcohol is most frequently used.

In the preparation of the tinctures, the medicine should be in the dry state, and properly comminuted by being bruised, sliced, or pulverized. It is usually better in the condition of a coarse than of a very fine powder; as in the latter it is apt to agglutinate, and thus present an impediment to the penetration of the menstruum. When several substances differing in solubility are employed, they should be added successively to the spirit, those least soluble first, those most so last; as otherwise the menstruum might become saturated with the ingredient for which it has the strongest affinity, and thus be rendered incapable of dissolving a due proportion of the others.

The Edinburgh College prepares tinctures by digestion with a heat from 90° to 100°, continued usually for seven days. Our own Pharmacopœia follows that of London, in directing maceration at ordinary temperatures, and extending the period to two weeks. The latter plan is preferable, as it is most convenient, and equally effectual, the lower temperature being compensated by the longer maceration. When circumstances require that the tincture should be speedily prepared, digestion may be resorted to. Care should always be taken to keep the vessel well stopped, in order to prevent the evaporation of the alcohol. The materials should be frequently shaken during the digestion or maceration; and this caution is especially necessary when the substance acted on is in the state of powder. The tincture should not be used till the maceration is completed, when it should be separated from the dregs either by simply filtering it through paper, or, when force is requisite, by first expressing it through linen, and subsequently filtering. Tinctures should be kept in bottles accurately stopped, in order to prevent evaporation, which might, in some instances, be attended with serious inconvenience, by increasing their strength beyond the officinal standard.

Medicines are most conveniently administered in tincture, which act powerfully in small doses, as the proportion of alcohol in which they are dissolved is too minute to produce an appreciable effect. Those which require to be given in large doses, should be cautiously employed in this form, lest the injury done by the menstruum should more than counterbalance their beneficial operation. This remark is particularly applicable to chronic cases of disease, in which the use of tinctures is apt to result in the establishment of fatal habits of intemperance. The tinctures of the weaker medicines are more frequently given as adjuvants of other remedies, than with the view of obtaining their own full effect upon the system.

The following general direction is given in the U.S. Pharmacopœia. "The Tinctures should be prepared in stopped glass bottles, and should be often shaken during the maceration." An equivalent direction is given by the British Colleges. W.

TINCTURA ALOES. *U.S., Lond., Dub.* TINCTURA ALOES SOCOTORINÆ. *Ed.* *Tincture of Aloes.*

"Take of Aloes, in powder, *an ounce;* Liquorice [extract] *three ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The British Colleges take half an ounce of Socotrine aloes, in powder, and an ounce and a half of liquorice. The *London College* macerates these with four fluidounces of rectified spirit and a pint of water for fourteen days; the *Edinburgh College* digests them with four ounces of stronger alcohol (alcohol, *U.S.*) and a pound of water for seven days; and the *Dublin College*, having previously dissolved the liquorice in eight ounces of boiling water, and added eight fluidounces of proof spirit, digests the whole for seven days.

The tincture of the U.S. Pharmacopœia differs from those of the British Colleges in being prepared with a stronger spirit, and is therefore more stimulating. The latter are little more than infusions, with the addition of sufficient alcohol to prevent spontaneous decomposition. The liquorice is added to cover the taste of the aloes; but it answers the end imperfectly; and the preparation, on account of its unpleasant bitterness, is little used, aloes being generally administered in the form of pill. The dose is from half a fluidounce to a fluidounce and a half. W.

TINCTURA ALOES ÆTHEREA. *Ed.* *Ethereal Tincture of Aloes.*

"Take of Socotrine Aloes, Myrrh, each, in powder, *an ounce and a half;* Saffron, cut, *an ounce;* Sulphuric Ether with Alcohol [Spirit of Sulphuric Ether] *a pound.* Digest the Myrrh with the Ether for four days; then add the Saffron and Aloes. Digest again for four days, and when the dregs have subsided, pour off the tincture," *Ed.*

This tincture differs from the following chiefly in consequence of the ether which it contains, and which may be found serviceable when spasm, or other irregular nervous action, accompanies the symptoms which call for the combined use of myrrh and aloes. It is very seldom employed in this country. The dose is one or two fluidrachms. W.

TINCTURA ALOES ET MYRRHÆ. *U.S., Ed.* TINCTURA ALOES COMPOSITA. *Lond. Dub.* *Tincture of Aloes and Myrrh.*

"Take of Aloes, in powder, Saffron, each, *three ounces;* Tincture of

Myrrh *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The process of the *London College* differs from the above only in the specification of Socotrine aloes. The *Dublin College* omits the saffron, but in other respects gives the same directions. The *Edinburgh College* takes two ounces of myrrh, a pound and a half of alcohol, and half a pound of water; digests for four days; then adds an ounce and a half of Socotrine aloes and an ounce of saffron; digests again for three days; and finally pours off the tincture from the sediment.

This tincture is a modification of the *elixir proprietatis* of Paracelsus. The saffron, which has been retained in compliance with former prejudices, can add little to the efficacy of the preparation; and, being very expensive, might with great propriety be much reduced. It serves, however, to impart a richness to the tincture, the want of which might he considered a defect by those accustomed to its use.

The tincture is purgative, tonic, and emmenagogue; and is considerably employed in chlorosis, and other disordered states of health in females, connected with suppressed, retained, or deficient menstruation ,and with a constipated state of bowels. It may also be used as a stomachic laxative in cold, languid habits, independently of menstrual disorder. The dose is from one to two fluidrachms. W.

TINCTURA ANGUSTURÆ. *U.S., Dub.* TINCTURA BONPLANDIÆ TRIFOLIATÆ. *Ed.* *Tincture of Angustura Bark.*

"Take of Angustura Bark, bruised, *two ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U. S.*

The *Dublin* process corresponds with the above, the bark being directed in coarse powder. The *Edinburgh College* takes two ounces of the bark in coarse powder, and two pounds and a half of diluted alcohol, and digests for a week.

This tincture contains the active principles of Angustura bark, and may be given in the dose of one or two fluidrachms. W.

TINCTURA ASSAFŒTIDÆ. *U.S., Lond.* TINCTURA FERULÆ ASSÆFŒTIDÆ. *Ed.* TINCTURA ASSÆFŒTIDÆ. *Dub.* *Tincture of Assafetida.*

"Take of Assafetida *four ounces;* Alcohol [Rectified Spirit, *Lond.*] *two pints.* Macerate for fourteen days, and filter through paper." *U.S., Lond.*

The *Edinburgh College* takes four ounces of assafetida, and two pounds and a half of alcohol, and digests for a week. The *Dublin* process differs from that of the U.S. Pharmacopœia only in triturating the assafetida with half a pint of water previously to the addition of the alcohol.

This tincture becomes milky on the addition of water, in consequence of the separation of the resin. It possesses all the virtues of assafetida. The medium dose is a fluidrachm.

Off. Prep. Enema Fœtidum, *Dub.* W.

TINCTURA AURANTII. *Lond.* *Tincture of Orange Peel.*

"Take of fresh Orange Peel *three ounces;* Proof Spirit *two pints.* Macerate for fourteen days, and filter." *Lond.*

It is the peel of the Seville orange which is intended by the London College; and the outer part only should be used, the inner whitish portion being inert. Brande says that the tincture may be prepared, without disadvantage, from the dried peel, of which two ounces are equal to three of the fresh. The tincture of orange peel is employed as a grateful addition to infusions, decoctions, and mixtures. It was omitted by mistake in the last edition of the Dublin Pharmacopœia, as it is an ingredient in one of the officinal preparations of that work.

Off. Prep. Mistura Ferri Aromatica, *Dub.* W.

TINCTURA BENZOINI COMPOSITA. *U.S., Lond., Ed.* TINCTURA BENZOES COMPOSITA. *Dub.* *Compound Tincture of Benzoin.*

"Take of Benzoin *three ounces;* Purified Storax *two ounces;* Tolu [balsam] *an ounce;* Aloes, in powder, *half an ounce;* Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The processes of the British Colleges do not materially differ from the above, which was taken originally from the *London* Pharmacopœia. The *Edinburgh* and *Dublin Colleges* direct a digestion of seven days; and the former employs an additional ounce of the balsam of tolu instead of the two ounces of purified storax.

This tincture is a stimulating expectorant, occasionally used in chrônic catarrhal affections, but more frequently as a local application to indolent ulcers. It is the *balsamum traumaticum* of the older Pharmacopœias, and may be considered as a simplified form of certain complex compositions, such as *baume de commandeur, Wade's balsam, Friars' balsam, Jesuits' drops, &c.*, which were formerly in repute, and are still esteemed among the vulgar as pectorals and vulneraries. *Turlington's balsam,* which is a popular remedy in this country for such purposes, consists, as usually prepared in Philadelphia, of the ingredients of the officinal tincture, with the addition of Peruvian balsam, myrrh, and angelica root.* It is scarcely necessary to state, that the application of these remedies to fresh wounds must frequently prove injurious, by inducing too much inflammation, and thus preventing union by the first intention. The compound tincture of benzoin is decomposed by water. The dose is from thirty minims to two fluidrachms. W.

TINCTURA BUCHU. *Dub.* *Tincture of Buchu Leaves.*

"Take of the Leaves of the Diosma crenata *two ounces;* Proof Spirit *a pint.* Macerate for seven days, and filter." *Dub.*

This tincture has the virtues of buchu leaves, and may be given in the dose of from one to four fluidrachms, either simply diluted with water, or as an addition to the infusion of the leaves. W.

TINCTURA CAMPHORÆ. *U.S., Ed.* SPIRITUS CAMPHORÆ. *Lond.* TINCTURA CAMPHORÆ sive SPIRITUS CAMPHORATUS. *Dub.* *Tincture of Camphor.*

"Take of Camphor *four ounces;* Alcohol *two pints.* Dissolve the Camphor in the Alcohol." *U.S.*

The *London* and *Dublin* preparations are the same with ours. The *Edinburgh College* directs an ounce of camphor to a pound of alcohol; and allows the tincture to be prepared with a double or triple proportion of camphor.

This is used chiefly as an anodyne embrocation in rheumatic and gouty pains, chilblains, and the inflammation resulting from sprains and bruises. It may also be employed internally; due regard being paid to the stimulant

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*The following is the formula for *Turlington's balsam* adopted by the Philadelphia College of Pharmacy. "Take of Alcohol Oviij., Benzoin ℥xij., Liquid Storax ℥iv., Socotrine Aloes ℥j., Peruvian Balsam ℥ij., Myrrh ℥j., Angelica root ℥ss., Balsam of Tolu ℥iv., Extract of Liquorice root ℥iv. Digest for ten days and strain." *Journ. of the Phil. Col. of Pharm.* v. 28.

properties of the alcohol. The camphor is precipitated by the addition of water, but may be suspended by the intervention of sugar. The dose is from five drops to a fluidrachm, first poured upon sugar, and then mixed with water. W.

TINCTURA CANTHARIDIS. *U.S., Lond., Dub.* TINCTURA CANTHARIDIS VESICATORIÆ. *Ed.* *Tincture of Spanish Flies.*

"Take of Spanish Flies, bruised, *three drachms;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S. Lond.*

The *Edinburgh College* orders a drachm of the flies and a pound of diluted alcohol; the *Dublin College,* two drachms of the former and a pint and a half of the latter; and both digest for a week.

This tincture is one of the most convenient forms for the internal use of Spanish flies, the virtues of which it possesses to their full extent. (See *Cantharis.*) It is occasionally employed externally as a rubefacient; but its liability to vesicate should be taken into consideration. The dose is from twenty drops to a fluidrachm, repeated three or four times a day. W.

TINCTURA CAPSICI. *U.S., Lond., Dub.* *Tincture of Cayenne Pepper.*

"Take of Cayenne Pepper *an ounce;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S., Lond., Dub.*

This form of capsicum is a useful stimulant in very low states of the system with great gastric insensibility, as in malignant, scarlet, and typhus fevers, and in the cases of drunkards. It may also be used as a gargle, diluted with rose water or some mucilaginous fluid. (See *Capsicum.*) Applied by means of a camel's hair pencil to the relaxed uvula, it sometimes produces contraction, and relieves prolapsus of that part. The dose is one or two fluidrachms. W.

TINCTURA CARDAMOMI. *U.S., Lond.* TINCTURA AMOMI REPENTIS. *Ed.* *Tincture of Cardamom.*

"Take of Cardamom, bruised, *four ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The process of the *Edinburgh College* agrees with the above, except that two pounds and a half of diluted alcohol are used instead of two pints, and digestion for a week instead of maceration for two weeks. The *London College* takes three ounces of the bruised seeds and two pints of proof spirit, and macerates for fourteen days.

This tincture is an agreeable aromatic, and may be advantageously added to tonic and purgative infusions. W.

TINCTURA CARDAMOMI COMPOSITA. *Lond., Dub.* *Compound Tincture of Cardamom.*

"Take of Cardamom Seeds, Caraway Seeds, Cochineal, each bruised, *two drachms;* Cinnamon Bark, bruised, *half an ounce;* Raisins, stoned, *four ounces;* Proof Spirit *two pints.* Macerate for fourteen days, and filter." *Lond.*

The *Dublin College* gives the same formula, omitting the cochineal and raisins, and directing the cardamom seeds freed from their husks.

This is a very agreeable aromatic tincture, occasionally used as a carminative, in the dose of one or two fluidrachms, but more frequently as an addition to mixtures, infusions, &c., which it renders pleasant to the taste, and acceptable to the stomach. W.

TINCTURA CASCARILLÆ. *Lond., Dub.* TINCTURA CROTONIS ELEUTHERIÆ. *Ed.* *Tincture of Cascarilla.*

"Take of Cascarilla Bark, in powder, *four ounces*; Proof Spirit *two pints.* Macerate for fourteen days, and filter." *Lond.*

The *Edinburgh College* employs four ounces of the bruised bark, and two pounds and a half of diluted alcohol; the *Dublin*, four ounces of the bark in coarse powder, and two pints of the menstruum. The former College digests, the latter macerates, for seven days.

The tincture has the properties of cascarilla, but is never used in this country. W.

TINCTURA CASTOREI. *U.S., Lond., Ed.* TINCTURA CASTOREI ROSSICI. *Dub.* *Tincture of Castor.*

"Take of Castor, bruised, *two ounces;* Alcohol *two pints.* Macerate for seven days, and filter through paper." *U.S.*

The *London* process corresponds with the above, except that the castor is directed in powder. The *Dublin College* employs the same proportions, but specifies the Russian Castor, and directs diluted alcohol or proof spirit, instead of alcohol or rectified spirit. The *Edinburgh College* takes an ounce and a half of castor in powder, and a pound of alcohol, and digests for seven days.

As castor yields little if any of its virtues to water, alcohol is a better solvent than proof spirit. It is said also to form a more grateful preparation. The Russian Castor should always be preferred when attainable. This tincture is used for the same purposes with castor in substance. The dose is from thirty minims to two fluidrachms. W.

TINCTURA CASTOREI COMPOSITA. *Ed.* *Compound Tincture of Castor.*

"Take of Castor, in powder, *an ounce;* Assafetida *half an ounce;* Ammoniated Alcohol *a pound.* Digest for seven days, and filter through paper." *Ed.*

This is an active stimulant and antispasmodic, applicable to cases of severe spasm of stomach, and to various hysterical and other nervous affections, unattended with inflammatory symptoms. The dose is from thirty minims to two fluidrachms. W.

TINCTURA CATECHU. *U.S., Lond., Dub.* TINCTURA ACACIÆ CATECHU. *Ed.* *Tincture of Catechu.*

"Take of Catechu *three ounces;* Cinnamon, bruised, *two ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S., Lond.*

The *Dublin* process differs from the above only in the period of maceration, which is seven days. The *Edinburgh College* orders three ounces of catechu, two ounces of cinnamon, and two pounds and a half of diluted alcohol; and digests for a week.

This is a grateful astringent tincture, useful in all cases to which catechu is applicable, and in which small quantities of spirit are not objectionable. It may often be advantageously added to cretaceous mixtures in diarrhœa. The dose is from thirty minims to three fluidrachms, which may be given with sweetened water or some mucilaginous liquid, or in Port wine when this is not contra-indicated. W.

TINCTURA CINCHONÆ. *U.S., Lond., Dub.* TINCTURA CINCHONÆ LANCIFOLIÆ. *Ed.* *Tincture of Peruvian Bark.*

"Take of Peruvian Bark, in powder, *six ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The British Colleges all designate the pale bark. The *London College* orders seven ounces to two pints of proof spirit, macerating for fourteen days; the *Edinburgh*, four ounces to two pounds and a half, digesting for a week; the *Dublin*, four ounces to two pints, digesting also for a week.

Of these tinctures, those of the United States and London Pharmacopœias are to be preferred, as they contain most bark; and in the bitter tinctures it is important that the alcohol should bear as small a proportion to the tonic principles as possible. Even the strongest, however, cannot, in ordinary cases, be given in doses sufficiently large to obtain the full effect of the bark, without stimulating too highly. The tincture of cinchona is used chiefly as an adjunct to the infusion or decoction, to a dose of which it may be added in the quantity of from one to four fluidrachms. W.

TINCTURA CINCHONÆ AMMONIATA. *Lond.* *Ammoniated Tincture of Peruvian Bark.*

"Take of the Bark of the Cinchona lancifolia [pale bark] *four ounces;* Aromatic Spirit of Ammonia *two pints.* Macerate for ten days, and filter." *Lond.*

This is an injudicious preparation, as the tonic properties of the bark are entirely lost in the stimulant action of the ammonia and alcohol. It is seldom if ever used. W.

TINCTURA CINCHONÆ COMPOSITA. *U.S., Lond., Ed., Dub.* *Compound Tincture of Peruvian Bark.*

"Take of Peruvian Bark, in powder, *two ounces;* Orange Peel [dried] *an ounce and a half;* Virginia Snakeroot, bruised, *three drachms;* Saffron, Red Saunders rasped, each, *a drachm;* Diluted Alcohol *twenty fluidounces.* Macerate for fourteen days, and filter through paper." *U. S.*

The British Colleges direct two scruples of cochineal in place of the red saunders, and specify the pale bark as the variety to be used. The *Dublin College* employs only half an ounce of orange peel. The *Edinburgh College* orders twenty ounces of alcohol (by weight), and digests for a week. In other respects, the processes correspond with that of the U.S. Pharmacopœia.

This is the preparation commonly known by the name of *Huxham's tincture of bark.* It is an excellent stomachic cordial, and, though too feeble in the principles of cinchona to serve as a substitute for that tonic when its full effect upon the system is required, may be very usefully employed as an addition to the decoction or infusion, or to the salts of quinia, in low forms of fever, particularly in malignant intermittents, and typhoid remittents. Huxham was in the habit of uniting with it the *elixir of vitriol,* the aromatic sulphuric acid of the Pharmacopœias. The dose is from one to four fluidrachms. W.

TINCTURA CINNAMOMI. *U.S., Lond., Dub.* TINCTURA LAURI CINNAMOMI. *Ed.* *Tincture of Cinnamon.*

"Take of Cinnamon, bruised, *three ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days and filter through paper." *U. S., Lond.*

The *Dublin* process differs from the above only in the quantity of cinnamon, which is hree ounces and a half. The *Edinburgh College* takes three ounces of cinnamon and two pounds and a half of diluted alcohol, and digests for a week.

This tincture has the aromatic and astringent properties of cinnamon, and may be used as an adjuvant to cretaceous mixtures, and astringent infusions or decoctions. The dose is from one to three or four fluidrachms. W.

TINCTURA CINNAMOMI COMPOSITA. *U.S., Lond., Ed.* *Compound Tincture of Cinnamon.*

"Take of Cinnamon, bruised, *six drachms;* Cardamom [seeds], bruised, *three drachms;* Ginger, bruised, *two drachms;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *London College* orders, in addition to the ingredients above mentioned, two drachms of powdered long pepper. The *Edinburgh College* orders of cinnamon and cardamom, each, an ounce; of diluted alcohol two pounds and a half; and digests for a week.

This is a very warm aromatic tincture, useful in flatulence, spasm of the stomach, and gastric debility. The dose is one or two fluidrachms. W.

TINCTURA SEMINUM COLCHICI. *Dub.* *Tincture of Meadow-Saffron Seeds.*

"Take of Meadow-saffron Seeds *two ounces;* Proof Spirit *a pint.* Macerate for fourteen days, and filter." *Dub.*

This tincture possesses the active properties of colchicum, and may be given whenever that medicine is indicated; but the wine, which contains less alcohol, is generally preferred. The dose is from ten to sixty drops. W.

TINCTURA COLOMBÆ. *U.S., Ed., Dub.* TINCTURA CALUMBÆ. *Lond.* *Tincture of Columbo.*

"Take of Columbo, bruised, *two ounces and a half;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The processes of the *London* and *Dublin Colleges* are the same with the above, the columbo being sliced instead of bruised. The *Edinburgh College* takes two ounces of the powdered root, and two pounds of diluted alcohol, and digests for seven days.

The tincture of columbo may be added to tonic infusions or decoctions, to increase their stimulant power; but, like all the other bitter tinctures, should be used with caution. It is especially applicable to the cases of drunkards. The dose is from one to four fluidrachms. W.

TINCTURA CONII. *Dub.* TINCTURA CONII MACULATI. *Ed.* *Tincture of Hemlock.*

"Take of Hemlock Leaves, dried, *two ounces;* Cardamom Seeds, bruised, *an ounce;* Proof Spirit *a pint.* Macerate for seven days, and filter." *Dub.*

The *Edinburgh College* takes two ounces of the dried leaves, half an ounce of cardamom, and sixteen ounces (by weight) of diluted alcohol, digests for seven days, and filters through paper.

This tincture affords a convenient method of administering hemlocks, the virtues of which it possesses. The dose is from thirty minims to a fluidrachm. W.

TINCTURA CROCI SATIVI. *Ed.* *Tincture of Saffron.*

"Take of Saffron, cut into shreds, *an ounce;* Diluted Alcohol *fifteen ounces* [by weight]. Digest for seven days and filter through paper." *Ed.*

This tincture possesses all the properties of saffron; but is of little other use than to impart colour to mixtures. W.

TINCTURA DIGITALIS. *U.S., Lond., Dub.* TINCTURA DIGITALIS PURPUREÆ. *Ed.* *Tincture of Foxglove.*

"Take of Foxglove [dried leaves] *four ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S., Lond.*

The *Edinburgh College* orders an ounce of the dried leaves, and eight ounces (by weight) of diluted alcohol; and digests for a week. The *Dublin College* directs two ounces of the dried leaves, (the larger being rejected,) in coarse powder, and a pint of proof spirit; and macerates for a week.

In preparing this tincture, great attention should be paid to the selection of the leaves, according to the rules laid down under the head of Digitalis. From a neglect of these, it is apt to be weak or inefficient. We have observed, in our own experience, a decided superiority in the tincture prepared from carefully preserved leaves imported from England. The tincture of foxglove possesses all the virtues of that narcotic, and affords a convenient method of administering it, especially in mixtures. The dose is ten drops, to be repeated two or three times a day, and increased, if necessary, with great caution. (See *Digitalis.*) W.

TINCTURA GALBANI. *Dub.* *Tincture of Galbanum.*

"Take of Galbanum, cut into small pieces, *two ounces;* Proof Spirit *two pints.* Digest for seven days, and filter." *Dub.*

The tincture of galbanum is analogous in properties to that of assafetida, but weaker, and less nauseous. It is very seldom used. The dose is from one to three fluidrachms. W.

TINCTURA GALLARUM. *Ed., Dub.* *Tincture of Galls.*

"Take of Galls, in powder, *four ounces;* Proof Spirit *two pints.* Digest for seven days, and filter." *Dub.*

The *Edinburgh College* takes two ounces of galls, and sixteen of diluted alcohol, and digests as above.

The tincture of galls is powerfully astringent; but is more used as a test than as a medicine. The dose is from one to three fluidrachms. W.

TINCTURA GENTIANÆ. *U.S.* TINCTURA GENTIANÆ COMPOSITA. *Lond., Ed., Dub.* *Tincture of Gentian.*

"Take of Gentian, bruised, *two ounces;* Orange Peel [dried] *an ounce;* Cardamom [seeds], bruised, *half an ounce;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The processes of the *London* and *Dublin Colleges* are essentially the same with the above. The *Edinburgh College* substitutes for the cardamom an equal weight of bruised canella alba, adds half a drachm of powdered cochineal to the other ingredients, and digests for a week with two pounds and a half of diluted alcohol.

This is an elegant bitter, much used in dyspepsia, and as an addition to tonic mixtures in debilitated states of the digestive organs, or of the system generally. There is, however, much danger of its abuse, especially in chronic cases. The dose is one or two fluidrachms. W.

TINCTURA GUAIACI. *U.S., Lond., Dub.* TINCTURA GUAIACI OFFICINALIS. *Ed.* *Tincture of Guaiac.*

"Take of Guaiac, in powder, *half a pound;* Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *London* process agrees with that of the United States Pharmacopœia. The *Edinburgh College* orders six ounces of guaiac and two pounds and a half of alcohol, and digests for a week. The *Dublin College* directs four ounces of the guaiac and two pints of alcohol, and macerates for a week.

This tincture is given in chronic rheumatism and gout, in the dose of from one to three fluidrachms three or four times a day. As it is decomposed by water, it is most conveniently administered in mucilage, sweetened water, or milk, by which the separated guaiac is held in temporary suspension. The following is a form of tincture of guaiac which Dr. Dewees has found very efficient in the cure of suppression of the menses, and dysmenorrhœa. "Take of the best Guaiac, in powder, *four ounces;* Carbonate of Soda or of Potassa *one drachm and a half;* Pimento, in powder, *an ounce;* Diluted Alcohol *a pound.* Digest for a few days." The dose is a teaspoonful three times a day, to be gradually increased if necessary. Within our own experience, this remedy has proved highly useful in painful menstruation, given in the intervals of the attacks. The quantity of alkaline carbonate is too small to produce any sensible effect, and the pimento can act only as a spice; so that the virtues of the tincture reside in the guaiac, and the officinal tincture would probably be found equally effectual. W.

TINCTURA GUAIACI AMMONIATA. *U.S., Lond., Ed., Dub.* *Ammoniated Tincture of Guaiac.*

"Take of Guaiac, in powder, *four ounces;* Aromatic Ammoniated Alcohol *a pint and a half.* Macerate for fourteen days, and filter through paper." *U.S.*

The processes of the British Colleges correspond with the above, except that the *Edinburgh College* directs a pound and a half of ammoniated alcohol instead of a pint and a half, and both this and the *Dublin College* shorten the period, the former of digestion, the latter of maceration, to a week.

This tincture is very celebrated in the treatment of chronic rheumatism. It is more stimulating and is thought to be more effectual than the preceding. Like that, it is decomposed by water, and should be administered in some viscid or tenacious vehicle which may hold the guaiac in suspension. The dose is one or two fluidrachms. W.

TINCTURA HELLEBORI NIGRI. *U.S., Lond., Ed., Dub.* *Tincture of Black Hellebore.*

"Take of Black Hellebore, bruised, *four ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *London* and *Dublin* processes correspond with the above, except that in the latter, the maceration is continued only for a week. The *Edinburgh College* takes two ounces of the bruised root, fifteen grains of powdered cochineal, and fifteen ounces (by weight) of diluted alcohol, and digests for a week.

This tincture possesses the properties of black hellebore, and upon the recommendation of Dr. Mead, has been much used in suppression of the menses. It is said to be peculiarly applicable to cases in which the grade of action is too high for the use of chalybeates. At best, however, it is an uncertain remedy, and should always be administered with caution, as it is sometimes violent in its action. The dose is from thirty minims to a fluidrachm, to be taken night and morning. W.

TINCTURA HUMULI. *U.S., Lond., Dub.* TINCTURA HUMULI LUPULI. *Ed.* *Tincture of Hops.*

"Take of Hops *five ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days; then express the liquor, and filter through paper," *U.S.*

The *London* and *Dublin* processes differ from the above only in the omission of expression. The *Edinburgh College* employs two pounds and a half of diluted alcohol, and digests for a week.

Hops are so light and bulky, that, in the proportion directed, they absorb almost all the spirit, which, after the requisite maceration, can be separated only by strong pressure. As this absorption of the spirit obstructs its proper action on all parts of the hops, it is necessary that the mixture should be frequently stirred during the maceration. By thoroughly drying the hops and rubbing them between the hands, or by cutting and bruising them, they may be brought to a state of division which will in great measure obviate the disadvantages alluded to. As the virtues of hops depend chiefly on the lupulin, and as the quantity of this substance is not the same in different parcels, the tincture is necessarily unequal in strength; and the tincture of lupulin itself is greatly preferable. (See *Tinctura Lupulinæ.*) The tincture of hops is tonic and narcotic, and has been proposed as a substitute for laudanum when the latter disagrees with the patient; but little reliance can be placed upon it. The condition of disease to which it appears to be best adapted, is the wakefulness, attended with tremors and general nervous derangement, to which habitual drunkards are liable, and which frequently precedes an attack of delirium tremens. The dose is from one to three fluidrachms. W.

TINCTURA HYOSCYAMI. *U.S., Lond., Dub.* TINCTURA HYOSCYAMI NIGRI. *Ed.* *Tincture of Henbane.*

"Take of Henbane [dried leaves], in powder, *four ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S. Lond.*

The *Edinburgh College* takes an ounce of the dried leaves and eight ounces (by weight) of diluted alcohol; the *Dublin*, five ounces of the former and two pints of the latter; and both Colleges digest for a week.

This tincture may be advantageously substituted, as an anodyne and soporific, for that of opium, when the latter disagrees with the patient, or is objectionable on account of its property of inducing constipation. When the tincture of henbane purges, as it sometimes does, it should be united with a very small proportion of laudanum, The dose is a fluidrachm. W.

TINCTURA IODINI. *U.S.* IODINII TINCTURA. *Dub.* *Tincture of Iodine.*

"Take of Iodine *half an ounce;* Alcohol *half a pint.* Dissolve the Iodine in the Alcohol." *U.S.*

The *Dublin College* takes two scruples of iodine, and an ounce (by weight) of rectified spirit, mixes, dissolves the iodine with the aid of heat, and keeps the solution in a well stopped phial.

The proportion of the Dublin College is one part of iodine to twelve of alcohol by weight, the same with that employed by Dr. Coindet. In the tincture of the United States Pharmacopœia, the proportion is one of iodine to about 12.7 of alcohol, sufficiently near the former to allow the two preparations to be considered identical for all practical purposes. We prefer the first process, as it conforms with those for the other tinctures in the use of a measured quantity instead of a certain weight of the menstruum. Dr. Coindet employed 48 grains to the French ounce (*poids de marc*)=576 grains; and it has been customary, in preparing the tincture, to employ the same quantity to the troy ounce, without attention to the fact that the latter contains only 480 grains, and is incapable of dissolving the whole of the iodine, the tincture of Coindet being a saturated or nearly saturated solution. It is best to prepare the tincture in small quantities only at a time; as there is reason to apprehend that the iodine may be acted on by the alcohol, and converted into ioduretted hydriodic acid by union with its hydrogen. The iodine should be freed from moisture before being weighed out. The tincture should be kept in well stopped bottles, in order to prevent the evaporation of the alcohol, and the consequent crystallization of the iodine.

The tincture of iodine has a deep brown colour. Sixteen minims, equal to about thirty-five drops, contain one grain of iodine. The dose is from ten to twenty drops, which may be gradually increased to thirty or forty drops, three times a day. It should be given in sweetened water. W.

TINCTURA JALAPÆ. *U.S., Lond., Dub.* TINCTURA CONVOLVULI JALAPÆ. *Ed. Tincture of Jalap.*

"Take of Jalap, in powder, *eight ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *London* and *Dublin* processes correspond with the above. The *Edinburgh College* takes three ounces of jalap and fifteen ounces (by weight) of diluted alcohol, and digests for seven days.

This tincture possesses the medical virtues of jalap, and is sometimes added to cathartic mixtures in the quantity of one or two fluidrachms, to increase their activity. W.

TINCTURA KINO. *Lond., Ed., Dub. Tincture of Kino.*

"Take of Kino, in powder, *three ounces;* Rectified Spirit *two pints.* Macerate for fourteen days, and filter." *Lond.*

The *Dublin College* uses the same proportions, but employs proof spirit or diluted alcohol, and macerates only for seven days. The *Edinburgh College* takes two ounces of kino and a pound and a half of diluted alcohol, and digests for a week.

This tincture, prepared with the kino brought into the United States, almost always becomes gelatinous when kept, and loses its astringency. It is, therefore, an ineligible preparation, and has been properly omitted in the last edition of the United States Pharmacopœia. The tincture of catechu should be substituted, or the kino employed in the state of filtered watery solution. The dose of the tincture is one or two fluidrachms. It is used chiefly as an addition to cretaceous and other astringent mixtures, in diarrhœa. W.

TINCTURA LOBELIÆ. *U.S. Tincture of Indian Tobacco.*

"Take of Indian Tobacco [the herb] *four ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

This tincture possesses the emetic and narcotic properties of lobelia, and is sometimes used in asthma, in the dose of one or two fluidrachms, repeated every two or three hours till its effects are experienced. W.

TINCTURA LUPULINÆ. *U.S. Tincture of Lupulin.*

"Take of Lupulin *four ounces;* Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

This is much superior to the tincture of hops of the former United States Pharmacopœia, in the place of which it was introduced into the last edition. In the original preparation, a certain quantity of hops was directed, from which the lupulin was to be separated by beating, and then digested in alcohol. As hops contain a variable proportion of lupulin, a tincture thus prepared must be of unequal strength; an objection to which the tincture of hops, however prepared, is liable. Besides, the amount of lupulin contained in any quantity of hops upon which alcohol can conveniently act, is too small in proportion to the alcohol, to afford a tincture of the due strength. The present tincture is, therefore, in all respects, preferable. The dose is one or two fluidrachms, to be given in sweetened water or some mucilaginous fluid. W.

TINCTURA MOSCHI. *U.S., Dub.* *Tincture of Musk.*

"Take of Musk *two drachms;* Alcohol *a pint.* Macerate for seven days, and filter through paper." *U.S.*

The *Dublin College* employs the same ingredients, and in the same proportions, but uses the musk *in powder*, and *digests* for a week.

This tincture is much too feeble in musk to be capable of producing beneficial effects in any dose which would not contain too large a quantity of alcohol. Musk should always be given in substance. W.

TINCTURA MYRRHÆ. *U.S., Lond., Ed., Dub.* *Tincture of Myrrh.*

"Take of Myrrh, bruised, *four ounces;* Alcohol *three pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *London* process corresponds with the above. The *Edinburgh College* directs three ounces of powdered myrrh, twenty ounces (by weight) of alcohol, and ten ounces of water; and digests for seven days. The *Dublin College* takes three ounces of bruised myrrh, a pint and a half of proof spirit, and half a pint of rectified spirit; and digests for a week.

Undiluted alcohol, as directed by the U. S. and London Pharmacopœias, is preferable, as a solvent of myrrh, to that fluid mixed with water; because it forms a perfectly clear solution, which is not attainable with the latter menstruum. The tincture of myrrh is scarcely ever used internally. As a local application it is employed to stimulate indolent and foul ulcers, and promote the exfoliation of bones, and, diluted with water, is applied to spongy gums, aphthous sore mouth, and ulcerations of the throat. The dose, as a stimulant expectorant and emmenagogue, is from half a fluidrachm to a fluidrachm.

Off. Prep. Tinctura Aloës et Myrrhæ. *U.S., Lond., Dub.* W.

TINCTURA NUCIS VOMICÆ. *Dub.* *Tincture of Nux Vomica.*

"Take of Nux Vomica, rasped, *two ounces;* Rectified Spirit *eight ounces.* Macerate for seven days, and filter." *Dub.*

The tincture is not an eligible form for administering the nux vomica, as it is equally uncertain with the medicine in substance, and has the disadvantage of excessive bitterness. The alcoholic extract, or strychnia is preferable. The dose of the tincture is from five to twenty drops. W.

TINCTURA OPII. *U.S., Lond., Ed., Dub.* *Tincture of Opium:*

"Take of Opium, in powder, *two ounces and a half;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The processes of the *London* and *Dublin Colleges* correspond with the above. The *Edinburgh College* directs two ounces of opium and two pounds of diluted alcohol, and digests for seven days.

The proportion of opium in the Edinburgh formula is so nearly the same with that employed in the others, that the resulting tinctures may be considered identical. In the original edition of the U. S. Pharmacopœia, the proportion of an ounce of opium to the pint of diluted alcohol was adopted, under the mistaken impression, that the pound of the Edinburgh Pharmacopœia, from which the process was taken, was equivalent to a pint; whereas it is in fact equal to no more than 0.79 of a pint of water, or about 0.845 of a pint of the officinal diluted alcohol. The tincture was therefore much weaker than that used in Great Britain. The error was corrected in the last edition of the Pharmacopœia, so that uniformity in relation to this preparation has now been established.

In the United States and Great Britain, this tincture is universally known by the name of *laudanum*. As this term was formerly applied to other preparations of opium, and still continues to be so on the Continent of Europe, the tincture is sometimes distinguished by the epithet *liquidum*, which, however, is seldom used in this country. *Tinctura Thebaica* is another title by which this preparation is known.

About two-thirds of the opium used in the preparation of the tincture are dissolved, the residue consisting chiefly of inert matter. Allowing the opium to be wholly exhausted of its active principles, one grain would be represented by 12.8 minims; but a small quantity of morphia has been detected in the residuary matter, so that the tincture is rather weaker than the proportion of opium employed would indicate.

The tincture of opium is used for all the purposes to which opium itself is applied. (See *Opium.*) The dose, equivalent to a grain of opium, is about thirteen minims, or twenty-five drops. It should be recollected, that a fluidrachm or teaspoonful of laudanum (sixty minims) will afford, on an average, about one hundred and twenty drops. Laudanum, when long kept, with occasional exposure to the air, becomes thick, in consequence of the evaporation of a portion of the alcohol, and the deposition of opium. If given in this state, it often acts with unexpected energy; and cases of death have resulted in infants from its use in doses which would have been entirely safe if the tincture had been clear.

Off. Prep. Enema Opii, *Dub.;* Liniment. Saponis cum Opio, *Dub.* W.

TINCTURA OPII ACETATA. *U.S.* *Acetated Tincture of Opium.*

"Take of Opium *two ounces;* Vinegar *twelve fluidounces;* Alcohol *half a pint.* Rub the Opium with the Vinegar; then add the Alcohol, and, having macerated for fourteen days, filter through paper." *U.S.*

This preparation was introduced into the last edition of our Pharmacopœia as a substitute for the *Acetum Opii* or *black drop* of the original work, the advantages of which it possesses, without being liable to the same objection of uncertainty of strength. The following directions for the preparation of the black drop were given in the first edition of the U. S. Pharmacopœia. "Take of Opium *half a pound;* Vinegar *three pints;* Nutmeg, bruised, *one ounce and a half;* Saffron *half an ounce.* Boil them to a proper consistence; then add, Sugar *four ounces;* Yeast *one fluidounce.* Digest for seven weeks, then place in the open air until it becomes a syrup; lastly, decant, filter, and bottle it up, adding a little sugar to each bottle." The merest tyro will discover in this process sources of uncertainty in the resulting preparation, which must very much detract from its value, and in fact render it unworthy of a place in a standard work. The *boiling to a proper consistence*, the digestion in the open air *until a syrup is formed*, the addition of a *little sugar* to each bottle, are all indefinite directions; and the practical result has been, that the *black drop* prepared according to them has no certain strength. The only advantage of the black drop over laudanum, is, probably, that the morphia exists in it in the state of an acetate. This advantage is secured in the acetated tincture of opium, the strength of which is as uniform as that of the opium from which it is prepared. This tincture was originally employed by Dr. Joseph Hartshorne of Philadelphia. The *black drop* has long been used under the name of *Lancaster* or *Quaker's black drop*, and the process for preparing it was first published by Dr. Armstrong, who found it among the papers of a relative of the original proprietor in England. In the original process, however, verjuice, or the juice of the wild crab, was employed instead of vinegar. Other vegetable acids also favourably modify the narcotic operation of opium; and lemon juice has been employed in a similar manner with vinegar or verjuice, and perhaps not less advantageously. The average product of the process for *acetum opii*, when carefully conducted, may be stated at *two pints*, and the strength of the preparation is such, that one drop is about equal to three of laudanum.

The *acetated tincture of opium* may often be advantageously used in cases in which laudanum or opium itself produces unpleasant effects, such as nausea and vomiting, intense headach, great nervous disorder, &c., but the introduction of the salts of morphia into use has in great measure superseded the necessity of the preparation. The dose is ten minims, or about twenty drops, equivalent to a grain of opium. W.

TINCTURA OPII AMMONIATA. *Ed.* *Ammoniated Tincture of Opium.*

"Take of Opium *two drachms;* Saffron, sliced, Benzoic Acid, each, *three drachms;* Oil of Aniseed *half a drachm;* Ammoniated Alcohol *sixteen ounces.* Digest for seven days, and filter through paper." *Ed.*

This tincture is used in Scotland under the title of *paregoric elixir*, but differs both in composition and strength from the preparation known by that name in the United States. It is employed in spasmodic complaints, such as whooping cough and asthma. Each fluidrachm contains about a grain of opium. W.

TINCTURA OPII CAMPHORATA. *U.S.*, *Ed.*, *Dub.* TINCTURA CAMPHORÆ COMPOSITA. *Lond.* *Camphorated Tincture of Opium. Paregoric Elixir.*

"Take of Opium, in powder, Benzoic Acid, Oil of Anise, each, *a drachm;* Liquorice [extract] *half an ounce;* Clarified Honey *two ounces;* Camphor *two scruples;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

None of the *British Colleges* employ liquorice or honey, and the *Dublin* alone, oil of anise. The *Edinburgh College* directs two pounds and a half of diluted alcohol, and digests for a week. In other respects their processes correspond with ours.

This is the well known *paregoric elixir.* It is a very pleasant anodyne and antispasmodic, much used to allay cough in chronic catarrh, asthma, consumption, pertussis, &c.; to relieve nausea and slight pains in the stomach and bowels; and, in infantile cases, to procure sleep. Half a fluidounce contains rather less than a grain of opium. The dose for an infant is from five to twenty drops, for an adult from one to two fluidrachms.* W.

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* The following formulæ have been adopted by the Philadelphia College of Pharmacy for the preparation of the two compound tinctures of opium so much used under the names of *Bateman's drops*, and *Godfrey's cordial.* So long as these nostrums are employed, it is important that they should be prepared in a uniform manner, and of a certain strength; as serious consequences may happen from diversity in the formulæ, when so active a substance as opium is the chief ingredient. Such diversity has existed to a very great extent, so much so that in one formula for Bateman's drops the quantity of opium was seven and a half grains to the pint, while in another it exceeded one hundred grains. It was in order to remedy this inconvenience, that the College was induced to adopt the formulæ here presented.

"*Bateman's pectoral drops.* Take of Diluted Alcohol Cong. iv., Red Saunders, rasped, ℥ij. Digest for twenty-four hours, filter, and add of Opium in powder ʒij., Catechu in powder ℥ij., Camphor ʒij., Oil of Anise fʒiv. Digest for ten days." This preparation

TINCTURA PIPERIS CUBEBÆ. *Dub.* *Tincture of Cubebs.*

"Take of Cubebs *four ounces;* Proof Spirit *two pints.* Macerate for fourteen days, and filter." *Dub.*

This may be used as a carminative, and has been applied with advantage to the treatment of gonorrhœa in the advanced stages. The dose is one or two fluidrachms. W.

TINCTURA QUASSIÆ. *U.S., Dub.* TINCTURA QUASSIÆ EXCELSÆ. *Ed.* *Tincture of Quassia.*

"Take of Quassia, rasped, *an ounce;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *Edinburgh College* uses two pounds and a half of diluted alcohol, and digests for seven days; the *Dublin College* macerates for seven days; in other respects their processes agree with ours.

This tincture may be employed as an addition to tonic infusions or mixtures, in the quantity of one or two fluidrachms at a dose. It is a pure and intense bitter. W.

TINCTURA RHEI. *U.S., Lond., Ed.* *Tincture of Rhubarb.*

"Take of Rhubarb, bruised, *three ounces;* Cardamom [seeds], bruised, *half an ounce;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *London College* employs but two ounces of rhubarb, and adds two drachms of saffron; the *Edinburgh* employs two pounds and a half of diluted alcohol, and digests for a week. In other respects their processes are the same with the above. W.

TINCTURA RHEI COMPOSITA. *Lond., Dub.* *Compound Tincture of Rhubarb.*

"Take of Rhubarb, sliced, *two ounces;* Liquorice Root, bruised, *half an ounce;* Ginger Root, sliced, Saffron, each, *two drachms;* Proof Spirit *a pint;* Water *twelve fluidounces.* Macerate for fourteen days, and filter." *Lond.*

The *Dublin College* substitutes half an ounce of cardamom seeds, husked and bruised, for the ginger, employs as the menstruum two pints of proof spirit, and macerates for seven days.

TINCTURA RHEI ET ALOES. *U.S., Ed.* *Tincture of Rhubarb and Aloes.* *Elixir Sacrum.* *Sacred Elixir.*

"Take of Rhubarb, bruised, *ten drachms;* Aloes, in powder, *six drachms;* Cardamom [seeds], bruised, *half an ounce;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *Edinburgh College* specifies Socotrine Aloes, employs two pounds and a half of diluted alcohol, and digests for a week.

TINCTURA RHEI ET GENTIANÆ. *U.S., Ed.* *Tincture of Rhubarb and Gentian.*

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is about equal in strength to the camphorated tincture of opium or paregoric elixir of the U.S. Pharmacopœia, containing about two grains of opium to the fluidounce.

"*Godfrey's cordial.* Take of Tincture of Opium Oiss., Molasses (from the sugar refiners) Oxvj., Alcohol Oij., Water Oxxvj., Carbonate of Potassa ℥iiss., Oil of Sassafras f ʒiv. Dissolve the Carbonate of Potassa in the Water, add the Molasses, and heat over a gentle fire till they simmer; take off the scum which rises, and add the Laudanum and Oil of Sassafras, having previously mixed them well together." This preparation contains the strength of rather more than one grain of opium in a fluidounce. *Journ. of the Phil. Col. of Pharm.* v. 26 and 27.

"Take of Rhubarb, bruised, *two ounces;* Gentian, bruised, *half an ounce;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *Edinburgh College* employs two pounds and a half of diluted alcohol, and digests for a week.

The above tinctures of rhubarb are all in a greater or less degree purgative, stomachic, and tonic; but, except in low states of the system, or in cases of individuals accustomed to the use of ardent spirits, they are too feebly cathartic in proportion to their stimulant power, to be advantageously employed, unless as adjuvants to other medicines. Combined with the neutral salts or other laxatives, or with tonic and stomachic mixtures, infusions, &c., they serve to render them warmer and more cordial to the stomach, and often prove beneficial in flatulent colic, dyspepsia, the costiveness of cold inirritable habits, diarrhœa, and other analogous complaints. One of them is to be preferred to another, according as its peculiar composition may, in the judgment of the practitioner, appear to adapt it to the circumstances of the case under treatment. In low forms of fever, when the indication is to evacuate the bowels, and at the same time stimulate the patient, the simple tincture (Tinctura Rhei) may be very advantageously used in doses of two or three fluidrachms, repeated at proper intervals till it operates. The ordinary dose of these tinctures, as purgatives, is from half a fluidounce to a fluidounce; as stomachics from one to two or three fluidrachms. W.

TINCTURA RHEI ET SENNÆ. *U.S.* *Tincture of Rhubarb and Senna.*

"Take of Rhubarb, bruised, *an ounce;* Senna *two drachms;* Coriander [seeds] bruised, Fennel-seed, bruised, each, *a drachm;* Red Saunders, rasped, *two drachms;* Saffron, Liquorice [extract], each *half a drachm;* Raisins, stoned, *half a pound;* Diluted Alcohol *three pints.* Macerate for fourteen days, and filter through paper." *U.S.*

This is the stomachic so well known, and so much used in this country, under the name of *Warner's gout cordial.* It is a feeble purgative, usually very acceptable to the stomach, and well adapted to cases of costiveness, with gastric uneasiness, in persons of a gouty habit, and accustomed to the free use of wine or other stimulant drink. The dose is from half a fluidounce to two fluidounces. W.

TINCTURA SANGUINARIÆ. *U.S.* *Tincture of Blood-root.*

"Take of Blood-root, bruised, *four ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

This will prove emetic in the dose of three or four fluidrachms; but it is rather intended to act as a stimulant to the stomach, or as an alterative, for which purposes it may be given in the quantity of from thirty to sixty drops. W.

TINCTURA SAPONIS CAMPHORATA. *U.S., Ed.* LINIMENTUM SAPONIS COMPOSITUM. *Lond.* LINIMENTUM SAPONIS. *Dub.* *Camphorated Tincture of Soap.*

"Take of Soap [Castile soap], in shavings, *four ounces;* Camphor *two ounces;* Oil of Rosemary *half a fluidounce;* Alcohol *two pints.* Digest the Soap with the Alcohol in a water-bath till it is dissolved; then filter, and add the Camphor and Oil." *U.S.*

The *London* and *Dublin Colleges* take three ounces of hard soap, an ounce of camphor, and a pint of spirit of rosemary. The former dissolves the camphor in the spirit, then adds the soap, and macerates in a sand-bath till it is dissolved; the latter digests the soap in the spirit till it is dissolved, and then adds the camphor. The *Edinburgh* process scarcely differs from that of the U. S. Pharmacopœia, half an ounce of the oil being employed instead of half a fluidounce, two pounds of alcohol instead of two pints, and the digestion being performed without a water-bath, and continued for three days.

It is necessary, in preparing this tincture, that the soap employed should not have been made with animal oil, as otherwise a portion will be deposited as the solution cools. The soap indicated by the U. S. Pharmacopœia is that "prepared from soda and olive oil," commonly called *Castile soap.* The preparation is usually called *soap liniment*, a name which more properly belongs to the *Linimentum Saponis Camphoratum* of the Pharmacopœia, or common *opodeldoc.*

The camphorated tincture of soap is much used, as an anodyne and gently rubefacient embrocation, in sprains, bruises, and local rheumatic or gouty pains.

Off. Prep. Linimentum Saponis cum Opio, *Dub.* W.

TINCTURA SAPONIS ET OPII. *Ed.* LINIMENTUM SAPONIS CUM OPIO vel LINIMENTUM ANODYNUM. *Dub.* *Tincture of Soap and Opium.*

"Take of Hard Soap, in shavings, *four ounces;* Opium *an ounce;* Camphor, *two ounces;* Oil of Rosemary *half an ounce;* Alcohol *two pounds.* Digest the Soap and Opium in the Alcohol for three days; then add to the filtered liquor the Camphor and Oil, and shake them well." *Ed.*

The *Dublin College* merely mixes four parts by measure of their liniment of soap (Tinctura Saponis Camphorata) with three parts of tincture of opium.

This tincture is commonly known by the name of *anodyne liniment*, and is employed for the same purposes with the preceding, from which it differs only in containing opium. It is most conveniently prepared by extemporaneously mixing the camphorated tincture with laudanum, as directed by the Dublin College. W.

TINCTURA SCILLÆ. *U.S., Lond., Dub.* TINCTURA SCILLÆ MARITIMÆ. *Ed.* *Tincture of Squill.*

"Take of Squill *four ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *London* process agrees with the above, freshly dried squill being directed. The *Dublin College*, using the same ingredients in the same proportions, directs that they should be macerated for seven days, then set aside, and the clear liquor decanted when the dregs have subsided. The *Edinburgh College* directs two ounces of the freshly dried squill and sixteen ounces (by weight) of diluted alcohol, and digests for a week.

The tincture possesses all the virtues of squill, and may be given for the same purposes, whenever the spirituous menstruum is not objectionable. The dose as an expectorant or diuretic is from ten to twenty minims (twenty to forty drops), and the latter quantity usually nauseates. W.

TINCTURA SENNÆ. *Lond.* TINCTURA SENNÆ COMPOSITA. *Dub.* *Tincture of Senna.*

"Take of Senna Leaves *three ounces;* Caraway Seeds, bruised, *three drachms;* Cardamom Seeds, bruised, *a drachm;* Raisins, stoned, *four ounces;* Proof Spirit *two pints.* Macerate for fourteen days, and filter." *Lond.*

The *Dublin* process differs from the above only in omitting the raisins, and quadrupling the quantities of the other ingredients.

This tincture is the *elixir salutis* of the old Pharmacopœias. It is a warm cordial purgative, useful in costiveness attended with flatulence, and in atonic gout, especially when occurring in intemperate persons. It is also added to cathartic infusions and mixtures. The dose is from two fluidrachms to a fluidounce or more. W.

TINCTURA SENNÆ ET JALAPÆ. *U.S.* TINCTURA SENNÆ COMPOSITA. *Ed.* *Tincture of Senna and Jalap.*

"Take of Senna *three ounces;* Jalap, bruised, *an ounce;* Coriander [seeds] bruised, Caraway [seeds] bruised, each, *half an ounce;* Cardamom [seeds] bruised, *two drachms;* Sugar [refined] *four ounces;* Diluted Alcohol *three pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *Edinburgh College* takes two ounces of senna, an ounce of jalap, half an ounce of coriander seeds, and three pounds and a half of diluted alcohol; digests for seven days; then filters, and adds to the filtered liquor four ounces of refined sugar.

This is another form of the *elixir salutis*, and scarcely differs from the preceding in virtues. It is given for the same purposes, and in the same doses. W.

TINCTURA SERPENTARIÆ. *U.S. Lond., Dub.* TINCTURA ARISTOLOCHIÆ SERPENTARIÆ. *Ed.* *Tincture of Virginia Snake Root.*

"Take of Virginia Snakeroot, bruised, *three ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *London* and *Dublin Colleges* give the same process with the above, the latter macerating only seven days. The *Edinburgh College* takes two ounces of snakeroot, a drachm of powdered cochineal, and two pounds and a half of diluted alcohol, and digests for a week.

This tincture possesses the tonic and cordial properties of the root, and may be advantageously added to the infusion of Peruvian bark in low states of the system. The dose is one or two fluidrachms. W.

TINCTURA STRAMONII. *U.S.* *Tincture of Thorn-apple.*

"Take of Thorn-apple Seed, bruised, *four ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

This tincture may be used for all the purposes for which stramonium is given, in the dose of from ten to twenty minims, repeated twice or thrice a day, and gradually increased till it obviously affects the sytem. W.

TINCTURA TOLUTANI. *U.S.* TINCTURA TOLUIFERÆ BALSAMI. *Ed.* TINCTURA BALSAMI TOLUTANI. *Dub.* *Tincture of Tolu.*

"Take of Tolu [balsam] *three ounces;* Alcohol *two pints.* Macerate till the Tolu is dissolved, and then filter through paper." *U.S.*

The *Edinburgh College* employs an ounce and a half of the balsam to a pound of alcohol; the *Dublin College* an ounce to the pint.

The tincture of tolu has the properties of the balsam, and may be employed as an addition to expectorant mixtures in chronic catarrhal affections; but the proportion of alcohol is too large to allow of its advantageous use in ordinary cases. The dose is one or two fluidrachms. In smaller quantities it is often employed to flavour cough mixtures. It is decomposed by water.

Off. Prep. Syrupus Balsami Tolutani, *Dub., Ed.* W.

TINCTURA VALERIANÆ. *U.S., Lond., Dub.* *Tincture of Valerian.*

"Take of Valerian, bruised, *four ounces;* Diluted Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The process of the *London* and *Dublin Colleges* correspond with the above, except that the latter continues the maceration only for a week.

This tincture possesses the properties of valerian, but cannot be given in ordinary cases, so as to produce the full effects of the root, without stimulating too highly in consequence of the large proportion of spirit. The dose is from one to four fluidrachms. W.

TINCTURA VALERIANÆ AMMONIATA. *U.S., Lond., Ed., Dub.* *Ammoniated Tincture of Valerian.*

"Take of Valerian, bruised, *four ounces;* Aromatic Ammoniated Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *London* process corresponds with the above. The *Edinburgh College* takes four ounces of powdered valerian, and two pounds and a half of ammoniated alcohol, and digests for a week. The *Dublin College* takes two ounces of the root, and a pint of the ammoniated spirit, and macerates for a week.

The ammonia in this preparation is thought to assist the solvent powers of the alcohol, while it co-operates with the valerian in medical operation. The tincture is employed as an antispasmodic in hysteria and other nervous affections. The dose is one or two fluidrachms, and should be given in sweetened water, milk, or some mucilaginous fluid. W.

TINCTURA VERATRI ALBI. *Ed.* *Tincture of White Hellebore.*

"Take of White Hellebore Root, bruised, *four ounces;* Diluted Alcohol *sixteen ounces* [by weight]. Digest for seven days, and filter through paper. *Ed.*

This tincture has the active properties of the white hellebore. It has been given to assist the action of cathartics, to produce vomiting in maniacal and lethargic affections, and with a view to its alterative effect in cutaneous diseases. But it is a dangerous remedy, producing in overdoses violent purging and vomiting, and not easily regulated as regards the dose. It should always be given in small quantities at first, and cautiously increased till its effects are experienced. The dose to begin with is from five to ten minims. W.

TINCTURA ZINGIBERIS. *U.S., Lond., Dub.* TINCTURA AMOMI ZINGIBERIS. *Ed.* *Tincture of Ginger.*

"Take of Ginger, bruised, *eight ounces;* Alcohol *two pints.* Macerate for fourteen days, and filter through paper." *U.S.*

The *London College* takes two ounces of ginger, sliced, and two pints of rectified spirit, and macerates for fourteen days. The *Dublin College* takes two ounces and a half of coarsely powdered ginger, and two pints of rectified spirit, and macerates for seven days. The *Edinburgh College* takes two ounces of bruised ginger, and two pounds and a half of diluted alcohol, and digests for a week.

The tinctures of the British Colleges are too weak with ginger, to be applied advantageously to any other purpose than merely to impart flavour. We greatly prefer the process of the U.S. Pharmacopœia, which yields a preparation in which the virtues of the ginger are not completely swallowed up in the menstruum. In consequence of the mucilaginous matter contained in ginger, the tincture made with diluted alcohol is apt to be turbid. Alcohol is therefore properly preferred by the U.S. and London Pharmacopœias. Good Jamaica ginger should be used.

The tincture of ginger is a useful carminative, and may often be beneficially added to tonic and purgative infusions or mixtures, in debilitated states of the alimentary canal. It is, however, in this country, chiefly used for the preparation of syrup of ginger, for which purpose it is necessary to employ the strong tincture of the U.S. Pharmacopœia.

Off. Prep. Syrupus Zingiberis, *U.S.* W.

TROCHISCI.

Troches.

Troches or lozenges are small, dry, solid masses, usually of a flattened shape, consisting of powders incorporated with sugar and mucilage. They are designed to be held in the mouth, and dissolved slowly in the saliva, and are therefore adapted for the administration of those medicines only which do not require to be given in very large quantities, and are destitute of any very disagreeable flavour. They are much more used, and more skilfully prepared, in Europe than in this country. Tragacanth, from the greater tenacity of its mucilage, is better suited to their formation than gum Arabic, which is in most instances directed by the U.S. and Edinburgh Pharmacopæias. The following directions for preparing them are taken from the *Dictionnaire des Drogues.* A mucilage of tragacanth is first prepared with cold water and strained. With this the powders, including sugar, are thoroughly mixed by rubbing upon a marble slab, and are thus formed into a paste, which is spread out by means of a roller upon the surface of the marble, previously powdered over with a mixture of sugar and starch. The thickness of the extended mass is rendered uniform by a frame upon which the ends of the roller are placed. The upper surface is now covered with a thin layer of sugar and starch, and the mass is divided into small cakes of a particular shape by means of a punch. These cakes are placed upon paper, and having been exposed to the air for twelve hours, are carried into a drying room moderately heated. When perfectly dry, they are thrown upon a sieve to separate the sugar and starch, and are then enclosed in bottles. In this way lozenges may be prepared from almost any medicine which the physician may deem it advisable to administer in that form. The following formula will serve as a guide. Take of citric acid, in powder, a drachm; refined sugar eight ounces; oil of lemons twelve minims; mucilage of tragacanth a sufficient quantity. Form them in the manner above directed into troches of twelve grains each. A species of lozenge is made by uniting the aromatic essential oils with sugar alone; but their preparation belongs to the confectioner rather than to the apothecary. The London and Dublin Pharmacopœias have omitted troches altogether. W.

TROCHISCI CALCIS CARBONATIS. *U.S.* **TROCHISCI CARBONATIS CALCIS.** *Ed.* *Troches of Carbonate of Lime.*

"Take of Prepared Carbonate of Lime *four ounces;* Gum Arabic *an ounce;* Nutmeg *a drachm;* Sugar *six ounces.* Rub them separately into powder; then mix them, and with water form them into a mass, to be divided into troches, each weighing ten grains." *U.S.* "Powder them together, and form them with water into a mass fit for making troches." *Ed.*

These are used as a gently astringent antacid in diarrhœa. W.

TROCHISCI GLYCYRRHIZÆ ET OPII. *U.S.* TROCHISCI GLYCYRRHIZÆ CUM OPIO. *Ed.* *Troches of Liquorice and Opium.*

"Take of Opium *two drachms;* Tincture of Tolu *half a fluidounce;* Syrup *half a pint;* Liquorice [extract], softened by hot water, Gum Arabic, in powder, each, *five ounces.* Rub the Opium thoroughly with the Tincture; then gradually add, first the Syrup and Extract, and afterwards the Gum, mixing them well together; lastly, dry the mass, and divide it into troches, each weighing ten grains." *U.S.*

The *Edinburgh College* directs half an ounce (by weight) of tincture of balsam of tolu, and eight ounces (by weight) of simple syrup. In other respects, the process is the same with the above.

In regard to these troches, Dr. Duncan, in his Dispensatory, states that "they are more easily prepared, and the uniform diffusion of the opium is more certainly attained, by previously drying and reducing to powder the opium and liquorice, which are to be intimately mixed with the powdered gum Arabic. This is to be beat into a mass first with the tincture, and then the syrup, and if necessary a little water gradually added." A preparation equivalent to the above is much used in Philadelphia under the name of *Wistar's cough lozenges.* A little oil of aniseed or oil of caraway is usually mixed with the other ingredients; but this addition, unless in very minute proportion, though it improves the flavour, interferes with the demulcent virtues of the preparation.

These troches are demulcent and anodyne, and very useful in allaying cough, when the state of the case admits the employment of opium, of which each of them contains about one-seventh of a grain. W.

TROCHISCI GLYCYRRHIZÆ GLABRÆ. *Ed.* *Troches of Liquorice.*

"Take of Extract of Liquorice, Gum Arabic, each, *one part;* Refined Sugar *two parts;* Boiling Water *a sufficient quantity.* Dissolve and strain; then evaporate the solution, by a gentle fire, to the consistence proper for forming troches." *Ed.*

These troches are useful in allaying cough, but are seldom employed; having been superseded by refined liquorice, which answers the same purpose, without being so cloying to the palate. W.

TROCHISCI GUMMOSI. *Ed.* *Gum Troches.*

"Take of Gum Arabic *four parts;* Starch *one part;* Refined Sugar *twelve parts.* Powder them, and with Rose Water make a mass fit for the formation of troches." *Ed.*

These are useful in allaying the irritation of the fauces which excites coughing, and may be employed at pleasure. W.

TROCHISCI MAGNESIÆ. *U.S.* *Troches of Magnesia.*

"Take of Magnesia *four ounces;* Gum Arabic *an ounce;* Nutmeg *a drachm;* Sugar *six ounces.* Prepare the Troches of Magnesia in the manner directed for those of Carbonate of Lime." *U.S.*

TROCHISCI CARBONATIS MAGNESIÆ. *Ed.* *Troches of Carbonate of Magnesia.*

"Take of Carbonate of Magnesia *six ounces;* Refined Sugar *three ounces;* Nutmeg *a scruple.* Powder them, and with Mucilage of Tragacanth make a mass fit for the formation of troches." *Ed.*

These and the preceding troches are useful in acidity of stomach, especially when attended with constipation. W.

TROCHISCI NITRATIS POTASSÆ. *Ed.* *Troches of Nitrate of Potassa.*

"Take of Nitrate of Potassa *one part;* Refined Sugar *three parts.* Powder them, and with Mucilage of Tragacanth make a mass fit for forming troches." *Ed.*

These troches, held in the mouth and allowed slowly to dissolve, form a cooling application in excessive salivation; and are useful in the incipient stages of inflammation of the throat. For internal use, the nitre is more conveniently taken in the form of powder or solution. W.

UNGUENTA.

Ointments.

These are fatty substances, softer than cerates, of a consistence resembling that of butter, and such that they may be readily applied to the skin by inunction. Many of them become rancid when long kept, and should, therefore, be prepared in small quantities at a time, or only when wanted for use. W.

UNGUENTUM ACIDI NITROSI. *Ed.* *Ointment of Nitrous Acid.*

"Take of Lard *a pound;* Nitrous Acid *six drachms.* Mix the Acid gradually with the melted Lard, and beat the mixture assiduously as it cools." *Ed.*

If the mixture be kept for a short time on the fire, it becomes of a yellow colour, and emits fumes of nitrous acid. The lard is oxidized at the expense of a portion of the acid, and combines with the remainder, assuming a firm consistence when it cools. The ointment thus prepared was originally employed by Alyon, under whose name it passes on the continent of Europe. It is useful in syphilitic ulcers, and in eruptive complaints, particularly psora and the different forms of porrigo; but it has been superseded by the ointment of nitrate of mercury, which is more efficient. W.

UNGUENTUM ACIDI NITRICI. *Dub.* *Ointment of Nitric Acid.*

"Take of Olive Oil *a pound;* Prepared Lard *four ounces;* Nitric Acid *five and a half fluidrachms.* Melt the Oil and Lard together in a glass vessel, and when they begin to congeal, add the Acid, and stir the mixture constantly with a glass rod till it stiffens." *Dub.*

This ointment possesses the same properties, and is used for the same purposes, as the preceding. W.

UNGUENTUM ACIDI SULPHURICI. *Dub.* *Ointment of Sulphuric Acid.*

"Take of Sulphuric Acid *a drachm;* Prepared Lard *an ounce.* Mix them." *Dub.*

In this process the acid is partly converted into sulphurous acid which escapes, and a portion of the lard is charred. The ointment is dark-coloured and fetid. It was a favourite application with Dr. Duncan, Senr. in scabies, and we have found it effectual in the same complaint. It may also be used with advantage in other eruptive affections, particularly ringworm. W.

UNGUENTUM AQUÆ ROSÆ. *U.S. Ointment of Rose Water.*

"Take of Rose Water, Oil of Almonds, each, *two fluidounces;* Spermaceti *half an ounce;* White Wax *a drachm.* Melt together, by means of a water-bath, the Oil, Spermaceti, and Wax; then add the Rose Water, and stir the mixture constantly until it is cold." *U.S.*

This preparation is much employed under the name of *cold cream.* It is a white, very soft, and elegant unguent, deriving a grateful odour from the rose water, which remains incorporated with the other constituents if kept enclosed in glazed vessels. It is a pleasant, cooling application to irritated and excoriated surfaces; and may be used with great advantage for chapped lips and hands so frequent in cold weather. W.

UNGUENTUM CANTHARIDIS. *U.S., Lond., Dub. Ointment of Spanish Flies.*

"Take of Spanish Flies, in powder [very fine powder, *Lond., Dub.*], *two ounces;* Distilled Water *half a pint;* Resin Cerate *eight ounces.* Boil down the Water with the Spanish Flies to one half, and strain; then mix the Cerate with the strained liquor, and evaporate to a proper consistence." *U.S., Lond., Dub.*

By this process, the active matter of the flies is more uniformly diffused through the ointment, than when they are directly incorporated, in the state of powder, with the other ingredients. The preparation is thus better calculated to meet the end proposed, of maintaining the discharge from blistered surfaces, without producing undue irritation. It is said that the virtues of the flies are impaired by the boiling; but experience has shown that considerable activity remains. It is necessary, after the strained decoction and cerate have been mixed, to stir constantly during the remainder of the process, in order to prevent the former from sinking to the bottom. It should be recollected, that this ointment is intended as a dressing for blisters, not to produce vesication. W.

UNGUENTUM INFUSI CANTHARIDIS VESICATORIÆ. *Ed. Ointment of infusion of Spanish Flies.*

"Take of Spanish Flies, White Resin, Yellow Wax, each, *one part;* Lard, Venice Turpentine, each, *two parts;* Boiling Water *four parts.* Macerate the Spanish Flies in the water for a night, and having strained the liquor with strong expression, boil it with the Lard till the water is evaporated; then add the Resin and Wax, and when these are melted, remove the mixture from the fire, and add the Turpentine." *Ed.*

This ointment differs from the preceding only in containing Venice turpentine, which increases its stimulant properties. W.

UNGUENTUM PULVERIS CANTHARIDIS VESICATORIÆ. *Ed.* CERATUM CANTHARIDIS. *Lond. Ointment of the Powder of Spanish Flies.*

"Take of Resin Ointment *seven parts;* Spanish Flies, in very fine powder, *one part.* Sprinkle the powder into the melted ointment, and stir the mixture constantly till it stiffens on cooling." *Ed.*

"Take of Spanish Flies, in very fine powder, *a drachm;* Spermaceti Cerate *six drachms.* To the Cerate softened by heat, add the Flies, and mix." *Lond.*

This ointment, like the two preceding, is intended as a dressing for blistered surfaces, with a view to maintain the discharge. The flies should be very finely powdered, in order that they may be diffused as uniformly as possible through the mass. It is unfortunate that the term *ceratum cantharidis* has been conferred upon this preparation by the London College, as the same name is properly employed in the U.S. Pharmacopœia to express the preparation of flies intended to be used as a vesicatory. None of these ointments can be used in individuals liable to strangury from the external application of cantharides. W.

UNGUENTUM CETACEI. *Lond.* *Spermaceti Ointment.*

"Take of Spermaceti *six drachms;* White Wax *two drachms;* Olive Oil *three fluidounces.* Melt them together over a slow fire, and stir them constantly until cold." *Lond.*

This ointment is employed as a mild dressing for blisters, wounds, and excoriated surfaces. It should be made in small quantities at a time, as it is apt to become rancid when long kept. W.

UNGUENTUM CONII. *Dub.* *Ointment of Hemlock.*

"Take of fresh Hemlock Leaves, Prepared Lard, each *two pounds.* Boil the Leaves in the Lard till they become crisp, and then express through linen." *Dub.*

The narcotic principle of fresh hemlock is extracted by lard with the aid of heat. The resulting ointment may be advantageously used, as an anodyne application to irritable piles, painful glandular swellings and scirrhous tumours, and to cancerous and other painful ulcers. W.

UNGUENTUM CUPRI ACETATIS. *U.S.* UNGUENTUM SUBACETATIS CUPRI. *Ed.* UNGUENTUM CUPRI SUBACETATIS. *Dub.* *Ointment of Acetate of Copper.*

"Take of Prepared Acetate of Copper, in powder, *an ounce;* Simple Ointment *fifteen ounces.* Add the Acetate of Copper to the Ointment previously melted over a gentle fire, and stir them constantly until they are cold." *U.S.*

"Take of Resinous Ointment [resin cerate] *fifteen parts;* Sub-Acetate of Copper, in very fine powder, *one part.* Sprinkle the Sub-Acetate into the melted Ointment, and stir the mixture till it stiffens upon cooling." *Ed.*

"Take of Prepared Subacetate of Copper *half an ounce;* Olive Oil *an ounce;* Ointment of White Resin [resin cerate] *a pound.* Rub the Subacetate with the oil; then add them to the Ointment previously melted, and mix." *Dub.*

This ointment is employed as a mild escharotic in fungous granulations, and, more or less diluted with lard, as a stimulating application to foul and flabby ulcers, scrofulous ulcerations of the edges of the eyelids, disease of the external meatus of the ear with purulent discharge, and to certain cutaneous eruptions, particularly that form of porrigo denominated *ringworm of the scalp.* W.

UNGUENTUM ELEMI. *Dub.* *Ointment of Elemi.*

"Take of Resin of Elemi *a pound;* White Wax *half a pound;* Prepared Lard *four pounds.* Make an ointment, and strain it through a sieve while hot." *Dub.*

UNGUENTUM ELEMI COMPOSITUM. *Lond.* *Compound Ointment of Elemi.*

"Take of Elemi *a pound;* Common Turpentine *ten ounces;* Prepared Suet *two pounds;* Olive Oil *two fluidounces.* Melt the Elemi with the Suet, and having removed them from the fire, immediately mix with them the Turpentine and Oil, and express through linen." *Lond.*

This ointment is employed as a gentle stimulant to weak ulcers, and may be used for maintaining the discharge of issues and setons. It is the *linimentum arcæi* of the older pharmacy. W.

UNGUENTUM GALLÆ. *U.S.* UNGUENTUM GALLARUM. *Dub.* *Ointment of Galls.*

"Take of Galls, in powder [very fine powder, *Dub.*], *an ounce;* Lard *seven ounces* [eight ounces, *Dub.*]. Mix them." *U.S., Dub.*

This is used chiefly in piles and prolapsus ani, though it may also be advantageously applied to indolent ulcers. To obviate the pain which it is liable to produce in irritable hemorrhoids, it is sometimes combined with powdered opium, in the proportion of a drachm of the powder to an ounce of ointment; but, thus modified, it requires to be used with caution. W.

UNGUENTUM HYDRARGYRI. *U.S., Ed., Dub.* UNGUENTUM HYDRARGYRI FORTIUS. *Lond.* *Mercurial Ointment. Strong Mercurial Ointment.*

"Take of Purified Mercury *two pounds;* Lard *twenty-three ounces;* Suet *an ounce.* Rub the Mercury with the Suet and a small portion of the Lard till the globules disappear; then add the remainder of the Lard, and mix." *U.S., Lond.*

"Take of Purified Mercury, Suet, each, *one part;* Lard *three parts.*—Rub the Mercury diligently in a mortar, with a little of the Lard, until the globules entirely disappear; then add the remainder of the fats. This Ointment may also be made with double or triple the quantity of Mercury." *Ed.*

"Take of Purified Mercury, prepared Lard, *equal weights.* Rub them together in a marble or iron mortar, till the globules of mercury disappear." *Dub.*

UNGUENTUM HYDRARGYRI MITIUS. *Lond., Dub.* *Mild Mercurial Ointment.*

"Take of Strong Mercurial Ointment *a pound;* Prepared Lard *two pounds.* Mix them." *Lond.*

The *Dublin College* prepares this ointment with twice the quantity of lard used in the preparation of the stronger ointment.

The U.S. Pharmacopœia directs only one mercurial ointment, which accords in strength with the strongest ointment of the London and Dublin Colleges, containing equal weights of mercury and fatty matter. When the physician wishes a weaker preparation, he may direct the ointment to be diluted with such a proportion of lard as may answer his purposes. The ointment of the Edinburgh College contains one part of mercury and four of fat, and may also be prepared with two parts, or three parts of the former; but even when strongest, it is not equal to our officinal ointment. The milder ointment of the London College contains one part of mercury to five of fat, that of the Dublin College, one of the former to two of the latter. If the apothecary keep a milder preparation in his shop, it should be that of the London College, which, from the smaller proportion of mercury, is preferable to that of the Dublin College for the purposes to which the milder ointment is usually applied. It should always be understood that the stronger ointment is intended by the physician, unless the contrary is expressly stated.

In the preparation of the mercurial ointment, care is requisite that the mercury should be completely extinguished. The trituration is best performed in a marble mortar, as it is difficult to keep iron so clean as not to impart more or less oxide to the ointment. The mercury is known to be extinguished, when a portion of the mass, rubbed upon paper or the back of the hand, exhibits no metallic globules. To facilitate the process, which is very tedious, the addition of various substances has been proposed, calculated to hasten the disappearance of the metal. Turpentine and sulphur have been employed for this purpose, but are both inadmissible, the former because it renders the ointment too irritating, the latter because it forms with the mercury an inactive sulphuret. Their presence in the ointment may be detected by the peculiar odour which they respectively emit when exposed to heat. Sulphur, moreover, gives the ointment a darker colour than it has when pure. Rancidity in the lard employed, also facilitates the extinguishment of the mercury, but is liable to the same objection as turpentine. M. Planche has proposed the oil of eggs; but M. Guibourt did not find it more effectual than fresh lard. The latter pharmaceutist recommends the addition of one-sixteenth of old mercurial ointment, which experience has shown to be very useful in promoting the thorough mixture of the mercury and lard, and which is liable to no practical objection. The following plan of preparing the ointment has been proposed by M. Chevallier. Having taken a pound of mercury and the same quantity of fresh lard, he introduces the metal with half the lard previously melted into a stone or glass bottle, shakes the mixture till it acquires the consistence of very thick syrup, then pours it into a mortar, and adds the remainder of the lard, stirring constantly. In this manner, according to Chevallier, a perfect ointment may be made in half an hour. But when prepared with lard alone, the ointment is apt, in hot weather, to become so soft as to allow the metal to separate. Hence the addition of suet in the processes of the U.S. and London Pharmacopœias; and even a larger proportion, as directed by the Edinburgh College, might be employed when the ointment is prepared for use in the summer season.

Mercurial ointment has when newly prepared a bluish colour, which becomes darker by age. It was formerly thought to contain the mercury in the state of protoxide; but it has been shown that most if not all of the metal can be separated from the lard by methods not calculated to reduce the oxide; and chemists now generally admit that it exists in the preparation in a state of minute division, not of chemical combination. Some, however, still maintain that the metal is partially oxidized; and the darker colour which the ointment acquires by age is attributed to the further oxidizement of the mercury. Mr. Donovan considers the common mercurial ointment as consisting partly of uncombined metal and lard, and partly of a chemical compound of the protoxide and lard; and to the latter portion alone he attributes its medicinal activity. A mixture of lard and the black oxide has not the same effect, because there is no chemical union between the ingredients, and this union, in his opinion, is necessary to the absorption of the mercurial. Upon exposing such a mixture to a temperature of 350° F. and continually agitating it for two hours, he found that every ounce of lard dissolved and combined with twenty-one grains of oxide; and the resulting compound was found to be equally effectual with the common ointment, and capable of being introduced into the system in one-third of the time. (Paris's Pharmacologia.) It has been proposed to substitute an ointment thus prepared for that made according to the officinal directions, as being more manageable, and of more uniform strength. In its preparation, care is requisite not to employ too high nor too low a temperature; as the former decomposes the oxide, and the latter is insufficient to effect its union with the lard.

Mercurial ointment, when rubbed upon the surface of the body, produces, in consequence of its absorption, the same general effects upon the system as the other preparations of the metal. It is resorted to either alone, when circumstances prevent or discourage the internal use of mercury, or conjointly with the internal use of the medicine, to produce a more speedy or powerful effect in urgent cases. It may also be advantageously employed as a resolvent in local affections, as in the case of venereal buboes, and of chronic glandular swellings, upon which it may be made to operate directly by being applied in the course of the absorbents which pass through the enlarged glands. The proper quantity to be employed atone time, with a view to salivation, is about a drachm, which should be applied night and morning, by means of friction, to the inner surface of the thighs, legs, or arms, and continued till the system is affected.

In urgent cases, or in local affections, it may also be rubbed on other parts of the body, or applied to blistered surfaces. The friction should on each occasion be continued till the whole of the ointment is absorbed. When frequently rubbed upon the same part, it is apt to produce a disagreeable eruption which interferes with its continued application. Camphor is sometimes added in order to render it more easy of absorption; but, without producing this effect, it increases the liability of the ointment to irritate the skin, and is of no other advantage than to soften its consistence, when too firm from a large proportion of suet.

The weaker ointment is employed only as an application to ulcers, and to certain cutaneous eruptions. W.

UNGUENTUM HYDRARGYRI AMMONIATI. *U.S.* UNGUENTUM HYDRARGYRI PRÆCIPITATI ALBI. *Lond.* UNGUENTUM HYDRARGYRI SUBMURIATIS AMMONIATI. *Dub.* *Ointment of Ammoniated Mercury. Ointment of White Precipitate.*

"Take of Ammoniated Mercury *an ounce;* Simple Ointment *eight ounces.* Add the Ammoniated Mercury to the Ointment previously softened over a gentle fire, and mix them." *U.S.*

The *London* and *Dublin Colleges* employ a drachm of the ammoniated mercury, and an ounce and a half of lard, and proceed as above.

This ointment is employed chiefly in cutaneous eruptions, such as psora, porrigo, and herpes. W.

UNGUENTUM HYDRARGYRI NITRATIS. *U.S., Lond.* UNGUENTUM NITRATIS HYDRARGYRI FORTIUS. *Ed.* UNGUENTUM HYDRARGYRI NITRATIS vel UNGUENTUM CITRINUM. *Dub.* *Ointment of Nitrate of Mercury. Citrine Ointment.*

"Take of Purified Mercury *an ounce;* Nitric Acid *eleven fluidrachms;* fresh Neats-foot Oil *nine fluidounces;* Lard *three ounces.* Dissolve the Mercury in the Acid; then melt the Oil and Lard together, and when they begin to stiffen [upon cooling], add the solution, and mix them." *U.S.*

"Take of Purified Mercury *an ounce;* Nitric Acid *eleven fluidrachms;* Prepared Lard *six ounces;* Olive Oil *four fluidounces.* First dissolve the Mercury in the Acid; then, while the solution is hot, mix it with the Lard and Oil previously melted together." *Lond.*

"Take of Purified Mercury *one part;* Nitrous Acid *two parts;* Olive Oil *nine parts;* Lard *three parts.* Dissolve the Mercury in the Acid; then beat up the solution strongly with the Lard and Oil when nearly stiff after having been melted together." *Ed.*

"Take of Purified Mercury *an ounce;* Nitric Acid *eleven drachms and a half;* Olive Oil *a pint;* Prepared Lard *four ounces.* Dissolve the Mercury in the Acid, then mix the solution with the Oil and Lard previously melted together, and form an ointment, in the manner directed for the Ointment of Nitric Acid." *Dub.*

This ointment should be prepared in a glass, porcelain, or well glazed earthenware vessel. Dr. A. T. Thomson says that "the addition of the metallic solution to the melted mixture of lard and oil should be gradual, and made in a broad flat vessel; while the stirring should be performed by a wooden spatula, and continued till the ointment be perfectly cool."

When recently prepared, the ointment has a beautiful yellow colour and a soft consistence, which, however, it is apt to lose by time, acquiring a dirty greenish hue, and becoming so hard and friable as to be unfit for application unless mixed with lard. This change has been attributed by some to the use of too large a proportion of lard, which, they say, is oxidized and hardened by the excess of acid. According to Dr. A. T. Thomson, the ointment, when prepared with only one-sixth of its weight of lard, retains its colour and consistence, if preserved in close pots, while with a larger proportion "it becomes hard, brittle, and of a pale dirty yellow hue, marbled with green blotches." This, however, is a mistake. It is the olive oil which is hardened by the supernitrate of mercury, and the ointment is firmer when made with that oil alone than with a proportion of lard. Hence, in the last edition of the U. S. Pharmacopœia, neatsfoot oil has been substituted for that of the olive, and with decided advantage. We had in our possession upwards of four months, a pot of ointment made according to the process of the Pharmacopœia, and, though it had, at the end of this time, partially assumed a greenish colour, it preserved a uniform, soft, unctuous consistence. It was prepared with nitric acid of the sp. gr. 1.335.*

Under the impression that the deterioration of the ointment is owing to the oxidizement of the oleaginous ingredients by the excess of nitric acid, it has been recommended to prepare it with a diminished quantity of acid, and at as low a temperature as possible. But this plan has not been found to answer the end in view. The following formula, which, Dr. Duncan informs us, yields the most perfect citrine ointment which he had seen, preserving a fine golden colour, and the requisite softness, is in direct opposition to formerly received notions. It was originally employed by Mr. Duncan of Edinburgh. "Take of nitrous acid twelve ounces, mercury four ounces, olive oil twenty-six and a half ounces, lard fifteen ounces; dissolve the mercury in the acid, and pour the solution while still hot into the lard melted in the oil, and also still hot, and mix in a vessel capable of containing five times the quantity, as a violent effervescence takes place. If it should not froth up, the action must be assisted by heat." In relation to this process, we quote the following observations from the Edinburgh Dispensatory. "The differences between this and the officinal formulæ are the much larger proportion of acid employed, and the higher temperature applied at the time of the mixture of the mercurial solution with the oily substances. The violent effervescence probably arises from a disengagement of nitric oxide, and it would appear that the rapid oxygenizement did not harden the oily substances so much as a slower change, and that a higher oxygenizement of the nitrate of mercury prevented its decomposition and gradual conversion into the state of protoxide, on which the slate colour of the officinal ointment, when long kept, probably depends. Mr. Duncan now prepares it entirely with lard, and it preserves equally the desired colour and consistence."

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* See "Remarks on the preparation of Citrine Ointment, by W. R. Fisher," in the Journ. of the Philadelphia College of Pharmacy, i. 171. It is said that the three ounces of lard directed in the U. S. formula may be advantageously dispensed with, and its place supplied by three additional fluidounces of the neats-foot oil. See the same Journal, iv. 197.

Medical Uses. This ointment is much and very advantageously employed, as a stimulant and alterative application, in various forms of porrigo, as tinea capitis and crusta lactea, in psoriasis and ptyriasis, in certain forms of herpes, in psorophthalmia and inflammation of the eye and eyelids connected with porrigo of the face or scalp, and in various other ulcerative and eruptive affections. It should be diluted with lard, unless in cases which require a very stimulant application. Some care is requisite in its use, to avoid the risk of salivation. When hard and friable, it must be rubbed up with fresh lard before it can be applied. W.

UNGUENTUM NITRATIS HYDRARGYRI MITIUS. *Ed.* *Milder Ointment of Nitrate of Mercury.*

"This is prepared in the same manner as the stronger ointment, with three times the quantity of Oil and Lard." *Ed.*

This is a useless preparation, as it can answer no other purpose than a mixture of the stronger ointment with lard. W.

UNGUENTUM OXIDI HYDRARGYRI CINEREI. *Ed.* *Ointment of Gray Oxide of Mercury.*

"Take of Gray Oxide of Mercury *one part;* Lard *three parts.* Mix them thoroughly." *Ed.*

This was intended to supply the place of the mercurial ointment, as a means of introducing mercury into the system by friction; but it has not stood the test of experience, and is therefore little employed. It is said that the oxide of mercury is not absorbed with the lard. Dr. Paris conjectures, upon the foundation of Mr. Donovan's experiments, (see *Unguentum Hydrargyri,*) that if subjected for some hours to a heat of 300°, it would become active, in consequence of the occurrence of a chemical union between the ingredients, which would enable the mercurial to be taken up by the absorbents. W.

UNGUENTUM HYDRARGYRI OXIDI RUBRI. *U.S.* UNGUENTUM HYDRARGYRI NITRICO-OXYDI. *Lond.* UNGUENTUM OXIDI HYDRARGYRI RUBRI. *Ed.* UNGUENTUM HYDRARGYRI OXYDI NITRICI. *Dub.* *Ointment of Red Oxide of Mercury.*

"Take of Red Oxide of Mercury, in very fine powder, *an ounce;* Simple Ointment *eight ounces.* Add the Oxide of Mercury to the Ointment previously softened over a gentle fire, and mix them." *U.S.*

"Take of Nitric Oxide of Mercury *an ounce;* White Wax *two ounces;* Prepared Lard *six ounces.* To the Wax and Lard, melted together, add the Nitric Oxide of Mercury, in very fine powder, and mix." *Lond., Dub.*

"Take of Red Oxide of Mercury by Nitric Acid, in very fine powder, *one part;* Lard *eight parts.* Mix them thoroughly." *Ed.*

The U.S. Pharmacopœia contemplates the same red oxide of Mercury as the British Colleges, that, namely, prepared from the nitrate, and usually called *red precipitate.*

This ointment loses its fine red colour when long kept, probably in consequence of the conversion of the red oxide into the black. It is best to prepare it only in small quantities at a time. It is a highly useful stimulating ointment, much employed in indolent and foul ulcers, in porrigo of the scalp, and in chronic conjunctival ophthalmia, especially when attended with thickening of the inner membrane of the eyelids, or with specks upon the cornea. It may be diluted with lard if found too stimulating. W.

UNGUENTUM IODINII. *Dub.* *Ointment of Iodine.*

"Take of Iodine *a scruple;* Prepared Lard *an ounce.* Rub them together so as to form an ointment." *Dub.*

This ointment, when rubbed upon the skin, imparts to it an orange colour, which, however, slowly disappears with the evaporation of the iodine. It is useful as a local application in goitre and scrofulous swellings of the glands, operating probably through the medium of absorption. When continued for some time, it occasionally produces a pustular eruption upon the portion of skin to which it is applied. W.

UNGUENTUM PICIS NIGRÆ. *Lond.* *Ointment of Pitch.*

"Take of Pitch, Yellow Wax, Yellow Resin, each, *nine ounces;* Olive Oil *a pint.* Melt them together, and strain throngh linen." *Lond.*

This is a stimulant ointment, applicable to the same purposes with the following.

UNGUENTUM PICIS LIQUIDÆ. *U.S.*, *Lond.* *Ed.*, *Dub.* *Tar Ointment.*

"Take of Tar, Suet, each, *a pound.* Add the Tar to the Suet previously melted over a gentle fire, and stir them constantly till they are cold." *U. S.*

The *London* and *Dublin Colleges* melt together equal parts of the tar and suet, and strain the mixture, the former through linen, the latter through a sieve. The *Edinburgh College* takes five parts of tar and two parts of yellow wax, and having melted the wax with a gentle heat, adds the pitch, and stirs constantly till the mixture stiffens.

Tar ointment is highly useful as a stimulant application in various scabby eruptions, particularly in that form of porrigo usually called tinea capitis or scald head. It should be applied night and morning; and in bad cases the patient should constantly wear a cap thickly spread with the ointment upon its internal surface. W.

UNGUENTUM PIPERIS NIGRI. *Dub.* *Ointment of Black Pepper.*

"Take of Prepared Lard *a pound;* Black Pepper, in powder, *four ounces.* Make an ointment." *Dub.*

This is highly irritating, and has been used as a remedy in tinea capitis, but is not now employed. W.

UNGUENTUM PLUMBI ACETATIS. *Dub.* CERATUM PLUMBI ACETATIS. *Lond.* UNGUENTUM ACETATIS PLUMBI. *Ed.* *Ointment of Acetate of Lead.*

"Take of Simple Ointment *twenty parts;* Acetate of Lead, in very fine powder, *one part.* Mix them thoroughly." *Ed.*

The *Dublin College* mixes an ounce of acetate of lead with a pound and a half of ointment of white wax. The *London College* melts two ounces of wax in seven fluidounces of olive oil; then adds two drachms of acetate of lead previously rubbed with a fluidounce of oil; and stirs with a wooden spatula till they are mixed.

This is an excellent ointment in burns, and iu other excoriated or ulcerated surfaces, particularly blisters in an inflamed state. W.

UNGUENTUM PLUMBI CARBONATIS. *U.S.*, *Dub.* UNGUENTUM CARBONATIS PLUMBI. *Ed.* *Ointment of Carbonate of Lead.*

"Take of Carbonate of Lead, in very fine powder, *two ounces;* Simple Ointment *a pound.* Add the Carbonate of Lead to the Ointment previously softened over a gentle fire, and mix them." *U. S.*

The *Edinburgh College* prepares this ointment by mixing thoroughly one part of carbonate of lead with five parts of simple ointment. The *Dublin College* employs the same proportions with the U.S. Pharmacopœia.

This ointment is used for the same purposes as the preceding. W.

UNGUENTUM POTASSÆ HYDRIODATIS. *Dub. Ointment of Hydriodate of Potassa.*

"Take of Hydriodate of Potassa [Iodide of Potassium] *a scruple;* Prepared Lard *an ounce.* Rub them together so as to form an ointment." *Dub.*

This is employed for the discussion of goitres, scrofulous tumours, and other indolent swellings; and is usually preferred to the ointment of iodine, as it does not like that discolour the skin. It is probably, however, of inferior virtue, and certainly contains too small a proportion of the iodide. One drachm to the ounce of lard would not be too much, and may sometimes be exceeded. W.

UNGUENTUM SAMBUCI. *Lond., Dub. Elder Ointment.*

"Take of Elder Flowers, Prepared Lard, each, *two pounds.* Boil the Elder Flowers in the Lard till they become crisp, then express through linen." *Lond.*

"Take of fresh Elder Flowers *three pounds;* Prepared Lard *four pounds;* Prepared Mutton Suet *two pounds.* Boil the Flowers in the Lard till they become crisp; then strain with expression; lastly, add the Suet, and melt them together." *Dub.*

Elder flowers impart odour to lard without adding to its virtues. W.

UNGUENTUM SCROPHULARIÆ. *Dub. Ointment of Figwort.*

"Take of fresh Figwort Leaves, Prepared Lard, each, *two pounds;* Prepared Mutton Suet *a pound.* Boil the Leaves in the fat till they become crisp, then strain with expression." *Dub.*

For the properties of this ointment, see *Scrophularia Nodosa.* W.

UNGUENTUM SIMPLEX. *U.S., Ed.* UNGUENTUM CERÆ ALBÆ. UNGUENTUM CERÆ FLAVÆ. *Dub. Simple Ointment.*

"Take of White Wax *a pound;* Lard *four pounds.* Melt them together with a gentle heat, and stir them constantly till they are cold." *U.S.*

The *Edinburgh College* orders five parts of olive oil and two parts of white wax. The *Dublin College* makes two preparations, one with white, the other with purified yellow wax, in each case mixing the wax with lard in the same proportion as directed in the U. S. Pharmacopœia.

This is a useful emollient ointment, occasionally employed as a mild dressing to blistered or excoriated surfaces, but more frequently as a vehicle for the application of more active substances. It is the basis of several officinal ointments. W.

UNGUENTUM STRAMONII. *U.S. Ointment of Thorn-apple.*

"Take of fresh Thorn-apple Leaves, cut in pieces, *a pound;* Lard *three pounds;* Yellow Wax *half a pound.* Boil the Thorn-apple Leaves in the Lard, till they become friable; then strain through linen; lastly, add the Wax previously melted, and stir them till they are cold." *U.S.*

Fresh narcotic vegetables yield their active principles, and chlorophylle or green colouring matter, to oleaginous substances, when heated with them; and several officinal ointments besides the present are prepared in this manner. In the pharmacy of the continent of Europe, olive oil is frequently employed as the solvent; and the resulting preparations are called *olea infusa.* Several of these are ordered by the Paris Codex, as the oils of henbane, thorn-apple, tobacco, &c. Lard is preferred in British and American Pharmacy, as affording preparations of a more convenient consistence. The boiling takes place at a lower temperature than that necessary for the evaporation of the lard or oil, and is owing to the escape of the watery parts of the plants. It should be continued till all the water is driven off; as this, if allowed to remain, will render the ointment more liable to spontaneous decomposition; and, besides, the colouring matter of the narcotic is not freely extracted till after the dissipation of the water.

The ointment of stramonium is a useful anodyne application in irritable ulcers, in painful hemorrhoids, and in some cntaneous eruptions. W.

UNGUENTUM SULPHURIS. *U.S., Lond., Ed., Dub. Sulphur Ointment.*

"Take of Sulphur *a pound;* Lard *four pounds.* Mix them." *U.S.*

The *London College* employs three ounces of sublimed sulphur and half a pound of lard; the *Edinburgh* and *Dublin Colleges*, the same proportion as directed in the U. S. Pharmacopœia.

Sulphur ointment is a specific for the itch. It should be applied every night till the complaint is cured; and it is recommended that only one-fourth of the body should be covered at a time. We have usually directed it to be applied over the whole surface, and have found no inconvenience to result. Four applications are usually sufficient to effect a cure. It is thought by some that powdered roll sulphur is more efficacious than the sublimed. The disagreeable odour of the ointment may be in some measure concealed by a little oil of lemons. W.

UNGUENTUM SULPHURIS COMPOSITUM. *U.S., Lond. Compound Sulphur Ointment.*

"Take of Sulphur *an ounce;* Ammoniated Mercury, Benzoic Acid, each, *a drachm;* Oil of Lemons, Sulphuric Acid, each, *a fluidrachm;* Nitrate of Potassa *two drachms;* Lard *half a pound.* To the Lard previously melted over a gentle fire add the other ingredients, and stir them constantly till they are cold." *U.S.*

This ointment is essentially different from that which is directed, under the same name, by the *London College.* Though, perhaps, not more efficient than the simple sulphur ointment in the cure of itch, it has a less unpleasant smell, and may be advantageously applied to the cure of other eruptive affections, such as tinea capitis and crusta lactea.

"Take of Sublimed Sulphur *half a pound;* White Hellebore Root, in powder, *two ounces;* Nitrate of Potassa *a drachm;* Soft Soap *half a pound;* Prepared Lard *a pound and a half.* Mix them." *Lond.*

This is thought to be more efficacious than the simple sulphur ointment; but the white hellebore renders it also more irritating. W.

UNGUENTUM TABACI. *U.S. Tobacco Ointment.*

"Take of fresh Tobacco, cut in pieces, *an ounce;* Lard *a pound.* Boil the Tobacco in the Lard over a gentle fire till it becomes friable; then strain through linen." *U.S.*

In the former edition of the U. S. Pharmacopœia, this ointment, under the name of "Tobacco Liniment," was directed to be prepared with common dried tobacco; but in this condition the leaves do not yield their virtues to lard. The error was corrected in the last edition. Though the tobacco plant is not an object of general culture in the Northern States, it may readily be produced in gardens, in quantities sufficient to supply any demand for the fresh leaves which can possibly arise. The remarks made under the head of *Unguentum Stramonii*, in relation to the preparation of ointments from the fresh narcotics, are applicable in this instance.

Tobacco ointment is useful in irritable ulcers, and various cutaneous eruptions, particularly *tinea capitis;* but great care must be taken, especially in infants, not to employ it in such quantities as to endanger the production of the constitutional effects of the narcotic. W.

UNGUENTUM TARTARI EMETICI. *Dub.* *Tartar Emetic Ointment.*

"Take of Tartrate of Antimony and Potassa *a drachm;* Prepared Lard *an ounce.* Rub the Salt into a very fine powder; then mix it with the Lard." *Dub.*

This may be more conveniently prepared with *simple ointment*, as lard is too soft to be spread on linen, and simple ointment is sufficiently so to be applied by inunction.

The peculiar eruptive effect of tartar emetic may be procured in various ways, either by means of a strong solution, or of the powder sprinkled upon the surface of some adhesive plaster, or of the ointment as above directed. The last method is, perhaps, the most convenient, and most generally resorted to. The proportion of tartar emetic may sometimes be advantageously increased to two or even three drachms, when a speedy effect is required, or the skin is not very susceptible to its action. A small portion of the ointment may be rubbed twice a day, or more frequently, upon the surface to be affected, or it may be applied spread upon a piece of linen. Care should be taken that the cuticle be entire, and that the application be not too long continued, as otherwise very severe inflammation, and even gangrenous ulceration, may result. We have, however, in some instances, of great urgency, applied the ointment to a surface recently scarified in the operation of cupping; but under such circumstances, it should be used with much caution. W.

UNGUENTUM VERATRI ALBI. *U.S.* UNGUENTUM VERATRI. *Lond.*, *Dub.* *Ointment of White Hellebore.*

"Take of White Hellebore [root], in powder, *two ounces;* Oil of Lemons *twenty minims;* Lard *eight ounces.* Mix them." *U.S.*, *Lond.*

The *Dublin College* employs the same proportion of white Hellebore and lard, but omits the oil of lemons.

This ointment is sometimes employed with advantage in the itch. It is less disagreeable, but also less certain than the sulphur ointment. W.

UNGUENTUM VERATRI VIRIDIS, *U.S.* *Ointment of American Hellebore.*

"Take of American Hellebore [root], in powder, *two ounces;* Oil of Lemons *twenty minims;* Lard *eight ounces.* Mix them." *U. S.*

This may be employed for the same purpose as the ointment of white hellebore.

UNGUENTUM ZINCI OXIDI. *U.S.* UNGUENTUM ZINCI. *Lond.* UNGUENTUM OXIDI ZINCI. *Ed.* UNGUENTUM ZINCI OXYDI. *Dub.* *Ointment of Oxide of Zinc.*

"Take of Oxide of Zinc *an ounce;* Lard *half a pound.* Mix them." *U.S.*, *Lond.*

The *Edinburgh College* employs six parts of simple liniment, and one of prepared oxide of zinc; the *Dublin*, one pound of ointment of white wax (simple ointment), and two ounces of the prepared oxide. In the latter case the ointment is melted before the addition of the oxide.

The oxide of zinc directed in the U.S. and London Pharmacopœias, is that obtained by precipitation, and, being in the state of fine powder, requires no previous preparation. That employed by the Edinburgh and Dublin Colleges, being procured by the combustion of the metal, requires to be levigated before it can be used for the formation of the ointment.

This preparation is employed as a mild astringent application in chronic ophthalmia with a relaxed state of the vessels, in various cutaneous eruptions, and in sore nipples and other instances of excoriation or ulceration. W.

UNGUENTUM OXIDI ZINCI IMPURI. *Ed.* *Ointment of Impure Oxide of Zinc.*

"Take of Simple Liniment *five parts;* Prepared Impure Oxide of Zinc *one part.* Mix them thoroughly." *Ed.*

This is the old *unguentum tutiæ*, or *tutty ointment.* It has been superseded in most of the Pharmacopœias by the last mentioned ointment, which is of a white instead of a gray colour, and is altogether a neater preparation. It is still, however, occasionally used in excoriations. W.

VINA MEDICATA.

Medicated Wines.

The advantages of wine as a pharmaceutic menstruum are, that, in consequence of the alcohol it contains, it dissolves substances insoluble in water, and, to a certain extent, resists their tendency to spontaneous change, while, at the same time, it is less stimulant than rectified or proof spirit, both from its smaller proportion of alcohol, and from the modified state in which this fluid exists in its composition. The acid which it usually contains, serves in some instances to increase its solvent power. But most wines, particularly the light varieties, are liable to undergo decomposition; and even the strongest acquire such a liability, from the principles which they extract from vegetable substances; so that medicated wines, though they keep much better than infusions or decoctions, are inferior in this respect to the tinctures. The proportion of alcohol, moreover, is not constant; and the preparations, therefore, made with them, are of unequal strength. From these causes, few medicated wines are at present retained. Indeed the London College has altogether discarded wine as a menstruum, and substituted in its place a mixture of water and proof spirit; still, however, retaining the title *vina* or *wines* for the preparations. We can see no advantage in this menstruum over wine of good quality, as, though of itself insusceptible of change, the substances which it dissolves serve as a ferment, and promote its decomposition. In the choice of wine, the purest and most generous should be selected. Teneriffe, as directed by the U.S. Pharmacopœia, Sherry, or Madeira, should be preferred. The medicated wines, in consequence of their liability to change, should be prepared in small quantities, without heat, and should be kept in well stopped bottles in a cool place. W.

VINUM ALOES. *U.S., Lond., Dub.* VINUM ALOES SOCOTORINÆ. *Ed.* *Wine of Aloes.*

"Take of Aloes, in powder, *an ounce;* Cardamom [seeds], bruised, Ginger, bruised, each, *a drachm;* Wine [Teneriffe] *a pint.* Macerate for fourteen days, with occasional agitation, and filter through paper. *U. S.*

The *Edinburgh* process differs from the above only in using two pounds of Sherry wine instead of a pint of Teneriffe, and digesting for one week instead of macerating for two.

"Take of Extract of the Aloe spicata *eight ounces;* Canella Bark *two ounces;* Proof Spirit, Distilled Water, each, *four pints.* Rub the Aloes into powder with clean white sand; rub the Canella Bark also into powder; and upon these, mixed together, pour the Spirit and Water. Macerate for fourteen days, occasionally stirring, and filter." *Lond.*

The *Dublin College* employs a menstruum consisting of three measures of Spanish white wine (Sherry), and one of proof spirit. In other respects its formula corresponds with that of the London College, one-half the quantity only being made, and the aloes being powdered without sand.

The sand directed by the London College assists in the pulverization of the aloes, and is said to prevent it from running together into masses when moistened by the fluid.

The wine of aloes is a warm stomachic purgative, useful in constipation dependent on a want of due irritability of the alimentary canal, and in complaints connected with this state of the bowels. It has long been used in chlorosis, amenorrhœa, dyspepsia, gout, paralysis, &c. It is said to leave behind it a more lax condition of the bowels than most other cathartics. The dose as as tomachic is one or two fluidrachms, as a purgative from half a fluidounce to two fluidounces. W.

VINUM COLCHICI RADICIS. *U.S.* VINUM COLCHICI. *Lond.* *Wine of Meadow-saffron Root.*

"Take of Meadow-saffron Root, bruised, *half a pound;* Wine *a pint.* Macerate for fourteen days, with occasional agitation, and filter through paper." *U.S.*

"Take of fresh Meadow-saffron Root, sliced, *a pound;* Proof Spirit *four fluidounces;* Distilled Water *eight fluidounces.* Macerate for fourteen days and filter." *Lond.*

This is intended to be a saturated vinous tincture of colchicum. The dried bulb is necessarily employed in this country, as the fresh is not kept in the shops. As the colchicum imported into the United States is of variable strength, the only method by which an active preparation can be ensured, is to employ a large quantity of the bulb in proportion to that of the menstruum. If the former should happen to be in excess, no other injury could result than a slight pecuniary loss, while a deficiency in the strength of the preparation would frequently be of serious detriment in urgent cases of disease. We have never been disappointed in obtaining the effects of colchicum from the wine which we knew to have been prepared according to the direction of the U. S. Pharmacopœia, while that which has been made with a smaller quantity of the bulb has often failed in our hands. The dose is from ten minims to a fluidrachm, to be repeated three or four times a day, or more frequently in severe cases, till its effects are experienced. In gout it is frequently given in connexion with magnesia; and in neuralgic cases we have found much advantage from combining it with the solution of sulphate of morphia, especially when we have desired to give it a direction rather to the skin than the bowels. W.

VINUM COLCHICI SEMINIS. *U.S.* *Wine of Meadow-saffron Seed.*

"Take of Meadow-saffron Seed, bruised, *an ounce;* Wine [Teneriffe] *a pint.* Macerate for fourteen days, with occasional agitation, and filter through paper." *U.S.*

As the seeds of colchicum are less liable to injury than the bulb, and are therefore of more uniform strength, there is not the same necessity for preparing a saturated tincture. The proportion of the seeds in the above process is the same as that recommended by Dr. A. T. Thomson in his Dispensatory. It would, perhaps, have been better, had two ounces been employed instead of one, so that the wine might have corresponded in strength with the officinal tinctures of the British Colleges in which the seeds are employed. (See *Tinctura Seminum Colchici*, Dub., and *Spiritus Colchici Ammoniatus*, Lond.) Dr. Williams, who introduced the seeds into use, recommends that they should not be bruised, as their virtues reside in their outer coat. The dose of this wine is one or two fluidrachms. W.

VINUM GENTIANÆ COMPOSITUM. *U.S., Ed.* *Compound Wine of Gentian.*

"Take of Gentian, bruised, *half an ounce;* Peruvian Bark, in powder, *an ounce;* Orange Peel, bruised, *two drachms;* Canella, bruised, *a drachm;* Diluted Alcohol *four fluidounces;* Wine [Teneriffe] *two pints.* Macerate for fourteen days, with occasional agitation, and filter through paper." *U.S.*

The *Edinburgh College* takes the quantities above mentioned of gentian, Peruvian Bark, Seville orange peel, and Canella; pours upon them, previously sliced and bruised, four ounces of diluted alcohol; then, after twenty-four hours, adds two pounds and a half of Sherry wine; and macerates for seven days.

This is a stomachic bitter, sometimes employed to promote appetite and invigorate digestion. It is apt, however, to become sour when kept. The dose is from four to eight fluidrachms. W.

VINUM IPECACUANHÆ. *U.S., Lond., Ed., Dub.* *Wine of Ipecacuanha.*

"Take of Ipecacuanha, bruised, *an ounce.* Wine [Teneriffe] *a pint.* Macerate for fourteen days, with occasional agitation, and filter through paper." *U.S.*

The *London College* takes two ounces of the bruised root, twelve fluidounces of proof spirit, and twenty fluidounces of distilled water; the *Dublin College*, two ounces of the bruised root, and two pints of Sherry Wine; both macerate for two weeks. The *Edinburgh College* employs one part of the root and fifteen parts of Sherry wine, and macerates for a week.

The preparations of the different Pharmacopœias are of the same strength. Wine of ipecacuanha possesses all the virtues of the root, and may be used as a substitute when it is desirable to administer the medicine in a liquid form. As it is milder, without being less efficacious than antimonial wine, it is in some instances preferable as an emetic in infantile cases, especially when the antimonial, as not unfrequently happens, is disposed to produce griping and irritation of the bowels. Under the same circumstances, it may be used as an expectorant and diaphoretic; and the effects of the Dover's powder may be obtained by combining it with laudanum or other liquid preparation of opium. The dose as an emetic, for an adult, is a fluidounce; as an expectorant and diaphoretic; from ten to thirty minims. A fluidrachm may be given as an emetic to a child one or two years old, and repeated every fifteen minutes till it operates. W.

VINUM OPII. *U.S., Lond., Ed., Dub.* *Wine of Opium.* *Sydenham's Laudanum.*

"Take of Opium *two ounces;* Cinnamon bruised, Cloves bruised, each, *a drachm;* Wine [Teneriffe] *a pint.* Macerate for fourteen days, with occasional agitation, and filter through paper." *U.S.*

The *London College* takes an ounce of extract of opium, a drachm of bruised cinnamon, a drachm of bruised cloves, six fluidounces of proof spirit, and ten fluidounces of distilled water; and macerates for eight days. The *Edinburgh College*, to the same quantity of extract of opium, cinnamon, and cloves, adds sixteen ounces of Sherry wine, and macerates for a week. The *Dublin College* takes an ounce of Turkey opium, a drachm of cinnamon, a drachm of cloves, and a pint of Sherry wine, and macerates for eight days.

The wine made according to the directions of the U. S. Pharmacopœia is a stronger preparation than that of the British Colleges, being a saturated vinous tincture of opium. It contains about the same proportions of the ingredients as the *laudanum of Sydenham*, from which it differs only in wanting a drachm of saffron. The spices which it contains are thought to adapt it to certain states of the stomach or system, in which the simple tincture of opium is found to produce unpleasant effects; but the same end may be obtained by an extemporaneous addition of some aromatic oil to the latter. Mr. Ware recommends it as a local application to the eye, in the latter stages of ophthalmia, when the vessels of the conjunctiva still remain turgid with blood. Two or three drops are introduced into the eye every morning till the redness disappears. The dose of the wine of opium is the same with that of the tincture. W.

VINUM RHEI. *U.S., Ed.* *Wine of Rhubarb.*

"Take of Rhubarb, bruised, *two ounces;* Canella, bruised, *a drachm;* Diluted Alcohol *two fluidounces* [two ounces, *Ed.*]; Wine *a pint* [Sherry Wine fifteen ounces, *Ed.*]. Macerate for fourteen days [seven days, *Ed.*], with occasional agitation, and filter through paper." *U.S., Ed.*

This is a warm cordial laxative, applicable to debilitated conditions of the system or alimentary canal requiring evacuation of the bowels. The dose is from two to eight fluidrachms or more, according to the amount of effect required, and the condition of the patient. W.

VINUM TABACI. *U.S.* VINUM NICOTIANÆ TABACI. *Ed.* *Wine of Tobacco.*

"Take of Tobacco, cut in pieces, *an ounce;* Wine [Teneriffe] *a pint.* Macerate for fourteen days, with occasional agitation, and filter through paper." *U.S.*

The *Edinburgh College* takes one part of dried tobacco leaves, and twelve parts of Sherry wine, and macerates for seven days.

The dose of the wine of tobacco as a diuretic, is from ten to thirty minims. It is very seldom used. W.

VINUM VERATRI ALBI. *U.S.* VINUM VERATRI. *Lond.* *Wine of White Hellebore.*

"Take of White Hellebore [root], bruised, *four ounces;* Wine [Teneriffe] *a pint.* Macerate for fourteen days with occasional agitation, and filter through paper." *U.S.*

The *London College* takes eight ounces of the sliced root, a pint of proof spirit, and a pint and a half of distilled water, and macerates for fourteen days.

It has been supposed that the wine of white hellebore, in consequence of the veratria which it contains, would act in the same manner with colchicum in the cure of gout and rheumatism; but it is uncertain and occasionally violent in its operation, and is very little used. The dose is ten minims two or three times a day, to be gradually increased till the peculiar effects of the medicine are experienced. W.

ZINCUM.

Preparations of Zinc.

ZINCI ACETAS. *U.S.* *Acetate of Zinc.*

"Take of Sulphate of Zinc *six ounces;* Acetate of Lead *eight ounces;* Distilled Water *a gallon.* Dissolve the Sulphate of Zinc and Acetate of Lead severally in four pints of the Distilled Water; then mix the solutions, and filter through paper; lastly, evaporate the filtered liquor, so that upon cooling it may crystallize." *U.S.*

Upon mingling the solutions of sulphate of zinc and acetate of lead, a double decomposition takes place, resulting in the formation of acetate of zinc which remains in solution, and sulphate of lead which precipitates. This latter is removed by filtration, and the clear liquor, by due evaporation, furnishes crystals of acetate of zinc. The proper quantities for mutual decomposition are 143.4 parts of the sulphate to 190.08 of the acetate, or one equiv. of each salt in the crystallized state. This ratio corresponds very nearly with that of the Pharmacopœia, which directs only a slight excess of the acetate.

A better method, according to Dr. Turner, for preparing this salt, is to suspend a piece of zinc in a dilute solution of acetate of lead for a sufficient length of time. The zinc takes the place of the lead, acetate of zinc is formed, and the lead is precipitated on the surface of the zinc in an arborescent form, called *arbor Saturni*, or *lead tree.* The precipitation of lead is known to be complete, when sulphuretted hydrogen produces in the solution a pure white precipitate. By this process the acetate of zinc is obtained quite pure.

Properties, &c. Acetate of zinc is in the form of white silky crystals, having the shape of hexagonal plates. It is very soluble in water, and slightly efflorescent in dry air. When heated before the blow-pipe on charcoal, it burns in the same manner with zinc. It is decomposed at a high temperature, and yields when distilled a considerable quantity of *pyro-acetic spirit.* It consists of one equiv. of acetic acid 51.48, one of oxide of zinc 40.3, and seven of water 63=154.78.

Medical Properties and Uses. Acetate of zinc is used as an external remedy only, for the most part as an astringent collyrium in ophthalmia, and injection in gonorrhœa, after the acute stage in these affections has passed over. It is officinal, in the crystallized state, only in the U.S. Pharmacopœia; the Edinburgh and Dublin Colleges ordering it, the former in aqueous solution, the latter in tincture. (See the *two following articles.*) It is, however, an improvement, to have the salt officinal in the solid form; as this state permits of its being prescribed in any desired proportion in solution, according to the nature of the case to which it is to be applied. The average strength of the solution, usually employed, is a grain of the salt to a fluidounce of distilled water. B.

SOLUTIO ACETATIS ZINCI. *Ed.* *Solution of Acetate of Zinc.*

"Take of Sulphate of Zinc *a drachm;* Acetate of Lead *four scruples;*

Distilled Water *twenty ounces* [by weight]. Dissolve the salts separately, each in ten ounces of the Water. Mix the solutions, and after the precipitate has subsided, filter the liquor." *Ed.*

In this formula, precisely the same changes take place as in the last; but the acetate of zinc, instead of being obtained in a solid state by evaporation, is allowed to remain in solution. The proportion also in which the salts are used is the same. From the amount of materials employed, it may be determined by calculation, that each fluidounce of the solution will contain about three grains of the acetate of zinc.

Medical Properties and Uses. The medical properties of this solution are the same with those of acetate of zinc. The salts employed to form it were formerly frequently prescribed together as an injection in gonorrhœa; but as a double decomposition necessarily took place, the prescription was equivalent to ordering a solution of acetate of zinc, mingled with a portion of the insoluble sulphate of lead. This mode of prescribing the acetate is objectionable, as the sulphate of lead is probably inert, if not injurious to the urethra. B.

ZINCI ACETATIS TINCTURA. *Dub.* *Tincture of Acetate of Zinc.*

"Take of Sulphate of Zinc, Acetate of Potassa, each, *one part.* Rub them together, and add of Rectified Spirit *sixteen parts.* Macerate for a week, with occasional agitation, and filter through paper." *Dub.*

In this process, the acetate of potassa first dissolves in the alcohol, and then reacts upon the sulphate of zinc; and in consequence of a double decomposition, sulphate of potassa and acetate of zinc are formed. Of these salts, the latter only is soluble in the rectified spirit, while the former remains undissolved, and is removed by the filtration.

Properties, &c. This tincture is transparent and colourless, and when evaporated nearly to dryness, affords crystals of acetate of zinc, recognizable by their shape and silky appearance. (See *Zinci Acetas.*) It is much stronger than the aqueous solution of the Edinburgh College, noticed in the preceding article; and, on account of the nature of its menstruum, is necessarily more stimulating. It is employed as an astringent collyrium and injection, but requires to be diluted with water. B.

ZINCI CARBONAS PRÆPARATUS. *U.S.* CALAMINA PRÆPARATA. *Lond.* CARBONAS ZINCI IMPURUS PRÆPARATUS. *Ed.* ZINCI CARBONAS IMPURUM PRÆPARATUM. *Dub.* *Prepared Carbonate of Zinc. Prepared Calamine.*

"Take of Carbonate of Zinc *any quantity.* Heat it to redness, and afterwards pulverize it; then reduce it to a very fine powder, in the manner directed for the preparation of Carbonate of Lime." *U.S.*

The *London* and *Dublin* processes agree essentially with the above.

"The Impure Carbonate of Zinc, after being roasted by those who make brass, is to be pulverised in an iron mortar, and levigated on a porphyry stone with a little water, and then put into a capacious vessel, and water poured upon it, which, after frequent agitation, is to be poured off while loaded with the powder. The subtle powder, which subsides on allowing the water to stand at rest, is to be dried. The coarse powder, which the water cannot suspend, is again to be levigated, and treated in the same manner." *Ed.*

The nature, properties, and composition of the native carbonate of zinc have been explained under another head. (See *Zinci Carbonas.*) The object of this process is to bring it to the state of an impalpable powder. It is first calcined, to render it more readily pulverizable, and then levigated and elutriated. During the calcination, water, and more or less carbonic acid are driven off; so that little else remains than the oxide of zinc, and the earthy impurities originally existing in the mineral.

Properties, &c. Prepared carbonate of zinc is in the form of a reddish-yellow powder, of an earthy appearance. It is used only as an external application, being employed as a mild astringent and exsiccant in excoriations and superficial ulcerations. For this purpose, it is dusted on the part, and hence the necessity for its being very finely levigated. It is often employed in the form of cerate. (See *Ceratum Zinci Carbonatis.*)

Off. Prep. Ceratum Zinci Carbonatis, *U.S.*, *Lond.*, *Ed.*, *Dub.* B.

ZINCI OXIDUM. *U.S.* ZINCI OXYDUM. *Lond.*, *Dub.* OXIDUM ZINCI. *Ed.* *Oxide of Zinc.*

"Take of Sulphate of Zinc *a pound;* Water of Ammonia *a sufficient quantity;* Distilled Water *four pints.* Dissolve the Sulphate of Zinc in the Distilled Water, and add sufficient Water of Ammonia to precipitate the whole of the Oxide of Zinc. Having poured off the clear liquor, wash the powder repeatedly with Distilled Water, and dry it by means of a sand-bath." *U.S.*

The *London College* takes a pound of the sulphate of zinc, a pint, or a sufficient quantity of water of ammonia, and a pint of distilled water, and proceeds as above.

"Place a large crucible in a furnace filled with live coals, so as to be somewhat inclined towards its mouth, and when the bottom of the crucible is moderately red, throw into it a piece of Zinc, *about a drachm* in weight. The Zinc soon inflames, and is converted at the same time into white flocks, which are to be removed from time to time from the surface of the metal by means of an iron spatula, in order that the combustion may be more complete; and at length, when the inflammation has ceased, the Oxide of Zinc is to be taken out of the crucible. Another piece of Zinc being then thrown in, the operation is to be gone through again, and may be repeated as often as necessary. Lastly, the Oxide of Zinc is to be prepared in the same manner as the impure Carbonate of Zinc." *Ed.*

"Take of Zinc, broken into pieces, *any quantity.* Throw it at intervals into a sufficiently deep crucible, heated to redness, and placed with its mouth inclined towards the mouth of the furnace. After the injection of each piece of Zinc, cover the crucible with another inverted over it, but loosely, so that the air may not be excluded. Preserve the light and very white sublimed powder for use." *Dub.*

The Pharmacopœias here adopt two different processes for obtaining this oxide, which require to be noticed separately. In the U.S. and London processes it is obtained by precipitation; in the Edinburgh and Dublin, by combustion. When ammonia is added to the solution of sulphate of zinc, sulphate of ammonia is formed, and oxide of zinc, in the state of hydrate, is thrown down as a gelatinous precipitate. Care must be taken not to add the ammonia in excess, as in that case it dissolves the precipitate at first produced. Pure sulphate of zinc should be employed, and not the sulphate of commerce, as the latter contains iron, which would be thrown down along with the oxide of zinc. If the commercial salt be used, the iron may be got rid of by adding an excess of ammonia, which will dissolve the pure oxide of zinc, to the exclusion of the oxide of iron. The ammoniacal solution, after being filtered, may then be evaporated to dryness, and the dry mass calcined. The *London College* has committed the error of ordering too little water for effecting the solution of the sulphate of zinc. This oversight has been corrected in the U.S. formula, in which, as recommended by Mr. Phillips, the water is taken at about five times the weight of the sulphate.

In the processes of the *Edinburgh* and *Dublin Colleges*, the combustibility of zinc is taken advantage of for producing this oxide. Zinc, when subjected to heat, melts at 680°, and immediately becomes covered with a film of gray oxide. When the temperature reaches nearly to redness, it takes fire and burns with an intense white light, giving rise to the oxide in the form of very light and white flocculi, resembling wool, which quickly fill the crucible, and are in part driven into the atmosphere by the current of air. It is to prevent loss from the latter circumstance, that the crucible, in the officinal formula, is inclined towards the mouth of the furnace, a position which prevents the axis of the crucible from coinciding with the direction of the draught. The oxide formed in the first instance, by covering the melted metal, impedes its further oxidation; and hence the necessity of continually removing it with a spatula or iron spoon, so as to expose a bright metallic surface to the action of the air. Notwithstanding every precaution, small portions of the metal will be mixed with the oxide when prepared in this way, and hence the *Edinburgh College* has ordered the product to be levigated and elutriated. The zinc is directed to be thrown into the crucible in successive pieces; but a better and more expeditious method is to put the whole of the zinc, intended to be converted into oxide, into a crucible large enough to be only two-thirds filled by it. Heat being applied, the zinc soon melts, and afterwards catches fire; and the oxide, as it is formed, is to be removed by means of a ladle with a long handle, until the whole of the metal is consumed.

Properties, &c. Oxide of zinc is in the form of an inodorous, tasteless, white powder, insoluble in water or alcohol. It is insoluble also in the carbonated fixed alkalies, but dissolves readily in acids, and, when newly precipitated and moist, in the caustic fixed alkalies, and in ammonia whether pure or carbonated. It is not decomposed nor volatilized by heat, and is very difficult of fusion. When heated moderately, it becomes yellow, and white again upon cooling if iron is not present; but otherwise, the yellow tint remains permanent. When prepared by combustion, it was formerly called *pompholix*, *nihil album*, *lana philosophica*, and *flowers of zinc*. It is sometimes adulterated with white lead or chalk. If it contain either, it will not be entirely soluble in dilute sulphuric acid, but an insoluble sulphate of lead or of lime will remain behind. When pure, its neutral solutions in acids give a white precipitate with sulphuretted hydrogen, or ferrocyanate of potassa. This oxide is the only well characterized compound of zinc with oxygen, and is uniformly present in the salts of this metal; but Berzelius and Thenard mention two others, a *suboxide* and a *superoxide*, which are not salifiable. It consists of one equiv. of zinc 32.3, and one of oxygen 8=40.3.

Medical Properties and Uses. Oxide of zinc has tonic properties, and has been used with advantage in chorea, epilepsy, hooping cough, spasms of the stomach dependent on dyspepsia, and other similar affections. Externally it is employed as an exsiccant to excoriated surfaces; sometimes by sprinkling it on the affected part, but generally in the form of ointment. (See *Unguentum Zinci Oxidi.*) The dose is from two to eight grains, several times a day, given in the form of pill. For internal use, the precipitated, as the purer oxide, should be preferred.

Off. Prep. Unguentum Zinci Oxidi, *U.S.*, *Lond.*, *Ed.*, *Dub.* B.

OXIDUM ZINCI IMPURUM PRÆPARATUM. *Ed. Prepared Impure Oxide of Zinc. Prepared Tutty.*

"This is prepared in the same manner as the Impure Carbonate of Zinc." *Ed.*

The nature of the impure oxide of zinc has been explained under another head. (See *Oxidum Zinci Impurum, Ed.*) The preparation which it is directed to undergo, consists in levigation and elutriation, with a view to bring it to the state of an impalpable powder. It is only used externally as an exsiccant to excoriations, being either dusted upon them tied up in a muslin bag, or applied in the state of an ointment. This oxide, however, is a useless addition to the materia medica; as, owing to its impurity and variable quality, it can in no case advantageously replace the pure oxide, which is officinal with all the Pharmacopœias. B.

Off. Prep. Unguentum Oxidi Zinci Impuri, *Ed.*

ZINCI SULPHAS. *U.S., Lond., Dub.* SULPHAS ZINCI. *Ed. Sulphate of Zinc. White Vitriol.*

"Take of Zinc, cut in small pieces, *four ounces;* Sulphuric Acid *six ounces;* Distilled Water *four pints.* To the Zinc and Water, previously introduced into a glass vessel, add by degrees the Sulphuric Acid; and when the effervescence shall have ceased, filter the solution through paper; then boil it down till a pellicle begins to form, and set it aside to crystallize." *U.S.*

The *London* process differs from the above, merely in directing the materials to be mixed, without specifying in what order.

"Take of zinc, cut into small pieces, *three parts;* Sulphuric Acid *five parts;* Water *twenty parts.* Mix them, and when the effervescence has ceased, digest for a little while on hot sand. Then pour off the solution, and filter it through paper; and after due evaporation, set it aside that crystals may form." *Ed.*

"Take of Zinc, broken into small pieces, *thirteen parts;* Sulphuric Acid *twenty parts;* Water *one hundred and twenty parts.* Put the Zinc into a glass vessel, and gradually add the Acid, previously diluted with the Water. When the effervescence has ceased, digest for a little while. Then filter and evaporate the solution, and after sufficient concentration, set it aside that crystals may form." *Dub.*

By this process, a pure and crystallized sulphate of zinc is obtained. *Strong* sulphuric acid has very little action on zinc, but when *diluted,* water is instantly decomposed, and while its hydrogen escapes with rapid effervescence, its oxygen combines with the zinc, and the oxide formed, uniting with the sulphuric acid, generates the sulphate of zinc. Thus it is perceived that *hydrogen* is a collateral product of this process, which, being easily performed, is generally resorted to for obtaining that gas. The proportions employed in the several formulæ are somewhat different. The zinc is to the acid as 4 to 6 in the U. S. and London processes; as 4 to 6.66 in the Edinburgh; and as 4 to 6.15 in the Dublin. The equivalent numbers give the ratio of 4 to 6.08; which indicates that the U. S. and London numbers approach very nearly to the true proportion. The U. S. Pharmacopœia is more precise than that of London or Edinburgh, as to the mixture of the materials. If they be mixed at once, without any precaution, the effervescence of hydrogen is apt to be excessive, and to cause the overflowing of the liquid. This is avoided by the Dublin direction to add the diluted acid gradually to the zinc, and more completely still in the U. S. formula, in which the solution of the zinc is commenced by a very dilute acid, which, as the action slackens, is made by degrees stronger and stronger, by the addition, at intervals, of small portions of fresh acid.

Preparation on a large scale. Sulphate of zinc in an impure state, as it occurs in commerce, is called *white vitriol.* In this state it is manufactured by roasting *blende* (native sulphuret of zinc) in a reverberatory furnace. This mineral, besides sulphuret of zinc, contains small quantities of the sulphurets of iron, lead, and copper; and by roasting is converted, in consequence of the oxidation of its constituents, into sulphate of zinc, mixed with the sulphates of iron, copper, and lead. The roasted matter is then lixiviated, and the solution obtained, after being allowed to settle, is concentrated by evaporation; so that, on cooling, it may concrete into a white crystalline mass, resembling white sugar. In this state, it always contains sulphate of iron, and sometimes a small portion of sulphate of copper. It may be purified to a certain extent by dissolving it in water, and boiling the solution with oxide of zinc, which converts the sulphates of iron and copper, by precipitating their bases, into sulphate of zinc. The purified solution is then decanted or filtered, and, after due evaporation, is allowed to crystallize. It has generally been proposed to purify the white vitriol of commerce by digesting its solution with metallic zinc, under an impression that this is capable of precipitating all the foreign metals; but, according to Berzelius, though it will precipitate copper readily, it has no action on the sulphate of iron. Neither is it capable of precipitating the base of sulphate of magnesia, a salt which is a very common impurity in white vitriol; and this objection is applicable also to the oxide of zinc as a precipitant.

Properties, &c. Sulphate of zinc is a white transparent salt, having a disagreeable, metallic, styptic taste, and crystallized usually in slender four-sided prisms, terminated by four-sided pyramids. Its crystals have considerable resemblance to those of sulphate of magnesia. It effloresces slightly in dry air, and though neutral in composition, is still capable of reddening vegetable blues. It dissolves in two and a half times its weight of cold, and in less than its weight of boiling water, and is insoluble in alcohol. When heated, it dissolves in its water of crystallization, which gradually evaporates; and by a prolonged ignition, the whole of the acid is expelled, and oxide of zinc is left. The caustic alkalies first precipitate its oxide, and then dissolve it when added in excess. The alkaline carbonates throw down the metal in the state of white carbonate. Pure sulphate of zinc is precipitated white by ferrocyanate of potassa. If copper be present, ammonia will produce a blue tinge; if iron, the ferrocyanate of potassa will cause a blue precipitate instead of a white one. Sulphate of zinc is incompatible with alkalies and alkaline carbonates, hydrosulphates, and lime-water, and causes a precipitate in astringent vegetable infusions.

The impure commercial variety of sulphate of zinc, called white vitriol, is in the form of irregular opaque masses, having some resemblance to white sugar. The lumps usually present, here and there, on the surface, yellow stains, produced by the oxide of iron. It is less soluble than the pure salt, on account of its containing less water of crystallization.

Composition. Crystallized sulphate of zinc consists of one equiv. of sulphuric acid 40.1, one of oxide of zinc 40.3, and seven of water 63=143.4. The white vitriol of commerce contains but three equivalents of water.

Medical Properties and Uses. This salt is tonic, astringent, and, in large doses, a prompt emetic. As a tonic, it is supposed to be well suited to cases of debility attended with irritation, being less heating than sulphate of iron. In dyspepsia it has been used with advantage in very minute doses, as for instance, a quarter of a grain, repeated several times a day; but if its good effects are not soon apparent, it should be laid aside. In obstinate intermittents, it is a valuable resource, and may be given alone, or conjoined with cinchona or sulphate of quinia. But it is in spasmodic diseases, such as epilepsy, chorea, pertussis, &c., that it has been principally employed as an internal remedy. Dr. Paris speaks of its efficacy in high terms, in spasmodic cough, especially when combined with camphor or myrrh, and "in affections of the chest attended with inordinate secretion." As an astringent, it is chiefly employed externally. In this mode of application, its solution constitutes a good styptic to bleeding surfaces, and is frequently resorted to as an injection in fluor albus and the advanced stages of gonorrhœa, and as a collyrium in ophthalmia. In some conditions of ulcerated sorethroat, it is found useful as a gargle. Before the discovery of tartar emetic, sulphate of zinc was almost exclusively employed to produce vomiting; but at present its use as an emetic is restricted principally to the dislodging of poisons, for which purpose its property of operating rapidly renders it particularly well suited. The dose, as a tonic, is from one to two grains; as an emetic, from ten to thirty grains. To children affected with hooping cough, it may be given in doses of from an eighth to a quarter of a grain two or three times a day. When used as a collyrium, injection, gargle, or wash for indolent ulcers, from one to three grains, or more, may be dissolved in a fluidounce of water. For medical purposes, the crystallized salt should be used, and in no case the impure white vitriol of commerce.

Off. Prep. Liquor Aluminis Compositus, *Lond.;* Solutio Acetatis Zinci, *Ed.;* Solutio Sulphatis Zinci, *Ed.;* Zinci Acetatis Tinctura, *Dub.;* Zinci Oxidum, *U.S.*, *Lond.* B.

SOLUTIO SULPHATIS ZINCI. *Ed.* *Solution of Sulphate of Zinc.*

"Take of Sulphate of Zinc *sixteen grains;* Water *eight ounces* [by weight]; Diluted Sulphuric Acid *sixteen drops.* Dissolve the Sulphate of Zinc in the Water; then, having added the Acid, filter through paper." *Ed.*

This formula is *intended* to furnish a solution of sulphate of zinc of proper strength for use as a collyrium and injection. The employment of the impure commercial salt appears to be contemplated by the *Edinburgh College;* and hence the diluted sulphuric acid is directed, with the intention of dissolving any excess of oxide which it may contain. The use, however, of the impure salt is improper; and were it otherwise, the proportion of salt employed, and the presence of the acid, render it too stimulating for the purposes for which it was designed. For these reasons the formula might very well be dispensed with. B.

APPENDIX.

I. DRUGS AND MEDICINES NOT OFFICINAL.*

In the progress of the medical art, numerous remedies have at different times risen into notice and employment, which, by the revolutions of opinion to which our science is incident, or by the discovery of more efficient substitutes, have so far fallen into disrepute as to have been discarded from general practice, and no longer to hold a place in the officinal catalogues. Of these, however, some are still occasionally employed by practitioners and referred to by writers, and many retain a popularity as domestic remedies, or among empyrics, which they have lost with the medical profession generally. The attention of physicians must, therefore, frequently be called to them in the course of practice; and it is highly desirable to possess some knowledge of their properties and effects, in order to be enabled to judge of their agency in any particular case, and at the same time to avoid the suspicion of incompetence which might attach to the exhibition of entire ignorance in relation to them. The remark is true also of other substances, which, though at no time ranked among regular medicines, are yet habitually employed in families, and the influence of which, either remediate or otherwise, must often enter into our estimate of the causes which produce or modify disease. New medicines, moreover, are frequently brought forward, which, without having obtained the sanction of the medical authorities, are occasionally prescribed, and therefore merit notice. To supply, to a certain extent, the requisite means of information in regard to these extra-officinal remedies, is the object of the following brief notices, among which are also included accounts of substances not employed as medicines, but usually kept in the drug stores for various purposes connected with the arts, or with domestic convenience. In a work intended for the use as well of the apothecary and druggist, as of the physician and medical student, the introduction of such accounts is obviously proper, if kept in due subordination to the more important object of teaching the properties of medicines, and the mode of preparing them. The authors regret that the limits which practical convenience appears to require in a Dispensatory, do not admit of a more complete enumeration of the various drugs and medicines of the kind above alluded to, or of ampler details in relation to those actually treated of, than will be found in the following pages. They have endeavoured, however, in the selection of objects, to choose those which are likely most frequently to engage the attention of the Medical and Pharmaceutical professions, and, in the extent of the descriptions, to consult as far as possible the relative importance of facts, of which they could not detail the whole. In relation to the nomenclature employed, it may be proper to observe, that all those vegetable remedies, which, not being generally kept in the shops, have no current commercial name, are described under the scientific title of the plant producing them; while other substances are designated by the names which ordinary usage has assigned them.

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* By the term officinal medicines, here as well as elsewhere in this work, are meant such as are designated in the United States and British Pharmacopœias.

ACETIC ETHER. *Æther Aceticus.* This ether was discovered by Lauraguais, in 1759. It may be formed by several processes, the chief of which are the following:—1. Mix 100 parts of alcohol, (sp. gr. 0.83) with 63 parts of concentrated acetic acid, and 17 parts of strong sulphuric acid, and distil 125 parts into a receiver, kept cold with wet cloths. 2. Distil to dryness, a mixture of 3 parts of acetate of potassa, 3 of alcohol, and 2 of sulphuric acid, and mix the distilled product with one-fifth of sulphuric acid, and distil a second time an amount of ether equal to the alcohol employed. 3. Distil 2 parts of effloresced acetate of lead, with 1 part of alcohol, and a little more than 1 part of sulphuric acid. In the two latter processes, the acetic acid is set free by the action of the sulphuric acid on the acetate employed.

Acetic ether is colourless, and possesses a very grateful odour, and a peculiar, agreeable taste. Its sp. gr. is 0.866 and its boiling point 160°. It undergoes no change by being kept. By contact of flame, it burns readily, diffusing an acid odour. It dissolves in seven and a half parts of water, and unites in all proportions with alcohol. It consists of one equiv. of acetic acid 51.48, one of etherine 28.48, and one of water 9=88.96. It is classed by Thenard as an organic-oxacid ether.

Acetic ether is occasionally used in medicine as a stimulant and antispasmodic. The dose is from fifteen to thirty drops, sufficiently diluted with water. It is sometimes employed externally, in frictions, as a resolvent, and for rheumatic pains.

ACHILLEA MILLEFOLIUM. *Milfoil. Yarrow.* This is a perennial herb, common to the old and new continents, though supposed to have been introduced into this country from Europe. It is abundant in old fields, along fences, and on the borders of woods and of cultivated grounds, throughout the United States. It is from a foot to eighteen inches high, and is distinguished by its doubly pinnate minutely divided leaves, from which it derived the name of milfoil, and by its dense corymb of whitish flowers, which appear throughout the summer, from June to September. The whole herb is medicinal. Both the flowers and leaves have an agreeable, though feeble aromatic odour, which continues after drying, and a bitterish, astringent, pungent taste. The aromatic properties are strongest in the flowers, the astringency in the leaves. The plant owes its virtues to a volatile oil, a bitter extractive, and tannin. The oil, which may be obtained separate by distillation with water, has the peculiar flavour of milfoil in a high degree. The active principles are extracted both by water and alcohol. The medical properties of the herb are those of a mild aromatic tonic and astringent. In former times it was much used as a vulnerary, and was also given internally for the suppression of hemorrhages, and of profuse mucous discharges. It has been recommended in intermittents, and as an antispasmodic in flatulent colic, and various affections dependent on nervous debility. At present it is little used. In some parts of Sweden it is said to be employed as a substitute for hops in the preparation of beer, which it is thought to render more intoxicating. It is most conveniently administered in the form of infusion. The volatile oil has been given in the dose of twenty or thirty drops.

ACTÆA SPICATA. *Baneberry. Herb Christopher.* This is a perennial, herbaceous, European plant, growing in the woods of mountainous regions, and attaining a height of two feet or more. The root is of a dark brown colour, and bears some resemblance to that of the Helleborus niger, for which it is said to be occasionally substituted in some parts of continental Europe. Its odour, in the recent state, is sweetish and rather nauseous, but is in great measure dissipated by drying. The taste is bitterish and somewhat acrid. In its operation on the system, the root is purgative and sometimes emetic, and is capable, in over doses, of producing dangerous effects. It is unknown in this country. We have, however, a native species of Actæa—the *A. Americana* of Pursh—of which there are two varieties—the *alba* and *rubra*—distinguished by the colour of their berries, which in the former are white, and in the latter red. They are sometimes called *white* and *red cohosh*, a name derived from the language of the aborigines. By some botanists they are considered as distinct species, under the name of *Actæa alba*, and *Actæa rubra*. They grow in the rich deep mould of shady and rocky woods, from Canada to Virginia. They are said to have been much esteemed by the Indians. Their medical properties are probably similar to those of the *A. spicata*. The name *baneberry*, applied to different species of Actæa, was derived from the reputed poisonous properties of their berries.

ADIANTUM PEDATUM. *Maidenhair.* An indigenous fern, the leaves of which are bitterish and somewhat aromatic, and have been supposed to be useful in chronic catarrhs and other pectoral affections. A European species known by the same vulgar name, is the *A. Capillus Veneris*, which has similar properties with the former, though feebler, and has been much used as a pectoral on the continent of Europe, from very early times. It is given in the form of infusion, sweetened with sugar or honey; and a syrup prepared from it is popular in France, under the name of *sirop de capillaire*. The name of maidenhair has also been given to the *Asplenium Trichomanes*, the leaves of which have a mucilaginous, sweetish, somewhat astringent taste, and have been used for the same purposes with those of the plants above mentioned. Another species of Asplenium, the *A. Adiantum-nigrum*, has been substituted for the genuine maidenhair; but neither of them has the aromatic flavour of that fern.

ÆSCULUS HIPPOCASTANUM. *Horsechesnut.* The horsechesnut is a native of Asia, and was introduced about the middle of the sixteenth century into Europe, where, as well as in this country, it is now extensively cultivated as an ornamental tree. The fruit and bark have been used in medicine. The *fruit* abounds in starch, but has a rough, unpleasant, bitter taste, which renders it unfit for food, though it is said to be eaten with avidity by horses, oxen, hogs, and sheep. It may be deprived, in great measure, of the bitter principle by maceration in an alkaline solution. It is asserted that the starch may be readily obtained in a state of purity, and that it excels as an article of diet that procured from the potato. (*Dict. de Mat. Med.*) The powdered kernel of the fruit, snuffed up the nostrils, produces sneezing, and has been used with advantage as a sternutatory in complaints of the head and eyes. The *bark* of the horsechesnut has attracted much attention on the continent of Europe, as a substitute for cinchona. That of the branches from three to five years old is considered best. It should be collected in the spring. The bark has little odour, but an astringent and bitter, though not very disagreeable taste. It contains, among other ingredients, bitter extractive and tannin, and imparts its virtues to boiling water. By numerous physicians it has been found very efficacious in the treatment of intermittent fever; but has entirely failed in the hands of many others; and certainly cannot be considered comparable to the Peruvian bark in its power over this complaint. It is at present very seldom used, and never in this country. It has been given in substance, decoction, and extract. From half an ounce to an ounce of the powder may be given in the course of twenty-four hours. The decoction is prepared and administered in the same manner with that of Peruvian bark.

AGAVE AMERICANA. *American agave. American aloe.* An evergreen succulent plant, indigenous in Florida, Mexico, and other parts of tropical America. This and other species of Agave bear a considerable resemblance, in appearance, to the plants of the genus Aloe, with which they are sometimes confounded. From the root and leaves of the American agave, when cut, a saccharine juice flows out, which may be converted by evaporation into syrup and even sugar, and by fermentation into a vinous liquor. This juice, when fresh, is said to be laxative, diuretic, and emmenagogue. The expressed juice, evaporated to the consistence of a soft extract, has the property of forming a lather with water, and is employed in some places as a substitute for soap. The fibres of the old leaves, separated by bruising and maceration in water, are used for forming thread.

AGRIMONIA EUPATORIA. *Common agrimony.* This species of agrimony is a perennial herb, inhabiting Asia, Europe, and North America, and in this country, found in fields and on the borders of woods, and flowering during the summer months. Its stem, which rises from one to three feet in height, is hairy, furnished with interruptedly pinnate leaves, and terminated by a long simple spike of yellow flowers. Both the herb and root have been employed. The former has a weak but agreeable aromatic odour, and a rough, bitterish, somewhat aromatic taste. The fragrance is strongest in the flowers. The root has similar properties; but its taste is more bitter and astringent. A volatile oil may be obtained from the plant by distillation with water. Agrimony is a mild corroborant and astringent. The herb has been considerably employed in relaxed conditions of disease, as in passive hemorrhages, and chronic affections of the mucous membranes. It has been highly recommended also, as a deobstruent in jaundice and visceral obstructions, and as an alterative in diseases of the skin. In Europe it is said to be popularly used, in the form of gargle, in affections of the throat. The Indians of North America and the Canadians are reported to have employed the root with advantage in fevers. The plant may be given in substance, infusion, or decoction. The dose of the powder is a drachm or more.

AJUGA CHAMÆPITYS. *Ground pine. Chamæpitys.* A low creeping, annual, labiate plant, a native of Europe, and found also in some parts of the United States.—The leaves, which bear some resemblance to those of the pine in shape, have a strong, peculiar, resinous, not disagreeable odour, and a bitter, balsamic taste. They yield by distillation with water a small proportion of volatile oil, resembling that of turpentine. They are said to be stimulant, diuretic, and aperient; and have been given in rheumatism, gout, palsy, and amenorrhœa. The dose of the leaves in powder is one or two drachms; but their infusion in wine is considered the best preparation.

The *Ajuga reptans* or *common bugle*, and the *A. pyramidalis*, perennial plants of Europe, have also been used in medicine. They are nearly inodorous, but have a somewhat astringent, bitterish, and saline taste. Their virtues are probably those of a mild astringent and tonic. They have been recommended in pulmonary consumption, hæmoptysis and other hemorrhages, and in hepatic obstructions, and have enjoyed considerable reputation as vulneraries; but they are at present nearly obsolete.

ALCHEMILLA VULGARIS. *Ladies-mantle.* A perennial European herb, growing in meadows, on the banks of rivulets, and in the borders of woods. The whole plant has an astringent bitterish taste, which is strongest in the root. It was formerly employed in diarrhœa, and other complaints requiring the use of astringents. By the ancients it was highly esteemed; and extraordinary powers were ascribed to it by the alchemists, from whom, according to Linnæus, it derived its generic title.

ALCORNOQUE. Under this name, a bark was introduced into Europe from South America, about thirty years since, and for a short time attracted considerable attention. It has been conjecturally referred by different writers to different plants; but its precise origin is unknown. In the Dictionary of Materia Medica of Merat and De Lens, it is described as being in large thick pieces, composed of two layers, of which the external is reddish, cracked, granular, spongy, and two or three lines in thickness, the internal lamellated, woody, and possessed of the property of imparting a yellow colour to the saliva when chewed. It is inodorous. The outer layer is of an astringent, somewhat bitter taste, and was thought to have febrifuge powers; the inner is much more bitter, and is decidedly emetic. The bark was brought into notice chiefly as a remedy in phthisis; but, failing to produce any favourable impression upon that complaint, in the hands of European practitioners, it has fallen into entire neglect. It was given in the form of powder, in the dose of thirty grains; or half an ounce of it was boiled in a pint of water down to half a pint, and two or three tablespoonfuls of the decoction were administered every two hours. In these doses it acted as an emetic.

ALISMA PLANTAGO. *Water plantain.* A perennial herbaceous plant, common to Europe and the United States, and growing in streams, pools, ditches, and other standing waters. The *root* has when fresh an odour like that of Florentine orris, but loses it when dried. Its taste is acrid and nauseous. It acquired at one time considerable credit as a preventive of hydrophobia, for which purpose it was said to have been used with great advantage in Russia; but subsequent experiments have proved its total inefficacy. The Calmucks are said to use it for food. The *leaves* are rubefacient, and will sometimes even blister when applied to the skin. They have been recommended in gravel and complaints of the bladder, in the dose of a drachm.

ALLIARIA OFFICINALIS, Andrz. *Erysimum Alliaria*, Linn. *Hedge garlic.* A perennial European herb, having when rubbed an odour like that of garlic, and of a bitterish somewhat acrid taste. When eaten it communicates an alliaceous smell to the breath. The herb and seeds are esteemed diuretic, diaphoretic, and expectorant, and have been given in humoral asthma, chronic catarrh, and other complaints in which garlic is considered useful. The herb has also been recommended as an external application in gangrenous affections, and to promote suppuration.

ALNUS GLUTINOSA. *Common European alder.* A European tree, of twenty-five feet or more in height, growing in swamps, on the sides of streams, and in other damp places. The bark and leaves are very astringent and somewhat bitter. The former has been used in intermittent fever, the latter as a topical remedy in wounds and ulcers. The bruised leaves are sometimes applied to the breast for the purpose of repelling the milk. The cones also are said to be astringent, and to form a useful gargle in complaints of the throat. All these parts of the tree are used in dying, and the leaves and bark in tanning. The *Alnus serrulata* or common *American alder* has propertiesanalogous to those of the European species.

AMBERGRIS. *Ambra grisea.* This substance, which is found floating on the sea, or thrown by the waves upon the shores of various countries, particularly in the southern hemisphere, is now generally believed to be produced in the intestines of the *Physeter macrocephalus* or spermaceti whale, and perhaps in those of some other fish. It is in roundish or amorphous pieces, usually small, but sometimes of considerable magnitude; and masses have been found weighing 50, 100, or even 200 pounds. These pieces are often composed of concentric layers. They are of various colours, usually gray, with brownish, yellow, and white streaks, often dark brown or blackish on the external surface. They are opaque, lighter than water, and of a consistence like that of wax. Ambergris has a peculiar aromatic agreeable odour, is almost tasteless, softens with the warmth of the hand, melts under 212°, is almost completely volatilizable by heat, and takes fire when heated in the open air. It is insoluble in water, but is readily dissolved, with the aid of heat, by alcohol, ether, and the volatile and fixed oils. It consists chiefly of a peculiar fatty matter analogous to cholesterin, and denominated by Pelletier and Caventou *ambrein.* This may be obtained by treating ambergris with heated alcohol, filtering the solution, and allowing it to stand. Crystals of ambrein are deposited. It differs from most other fatty matters by not forming soaps with the alkalies. When pure it has little or no odour. The other constituents of ambergris do not appear to have been thoroughly investigated. It is often adulterated; but does not then exhibit its ordinary fusibility and volatility. Ambergris was long regarded as a cordial and antispasmodic, somewhat analogous to musk in its mode of action; and has been recommended in typhoid fevers, and various nervous diseases. It formerly entered into a great variety of officinal preparations, and is still retained by some of the Pharmacopœias of the continent of Europe. It is, however, in all probability very feeble in remediate power, and is much more used in perfumery than in medicine. The dose is from five grains to a drachm.

ANACARDIUM OCCIDENTALE, Linn. *Cassuvium pomiferum*, Lam. *Cashew-nut.* A small and elegant tree, growing in the West Indies, and other parts of tropical America. A gum exudes spontaneously from the bark, which bears some resemblance in appearance to Gum Arabic, but is only in part soluble in water, and consists of proper gum and bassorin. It is the *gomme d'acajou* of the French writers. The fruit is more important. It is a fleshy, pear-shaped receptacle, supporting at its summit a hard, shining, ash-coloured, kidney-shaped nut, an inch or more in length, three-quarters of an inch broad, consisting of two shells, with a black juice between them, and of a sweet oily kernel within the inner shell. The receptacle is of a red or yellow colour, and of an agreeable sub-acid flavour with some astringency. It is edible, and affords a juice which has been recommended as a remedy in dropsy. This juice is converted by fermentation into a vinous liquor, from which a spirit is obtained by distillation, much used in making punch, and said to be powerfully diuretic. The nuts are well known under the name of *cashew nuts.* The black juice contained between their outer and inner shell, is extremely acrid and corrosive, producing, when applied to the skin, severe inflammation, followed by blisters or desquamation of the cuticle. It is used in the West Indies for the cure of corns, warts, ringworms, and obstinate ulcers, and is said to be sometimes applied to the face by females in order to remove the skin, and produce a fresher and more youthful aspect. The worst case of external poisoning which has ever come under our notice, was produced in a lady who was exposed to the fumes of the nut while roasting. The face was so much swollen that for some time not a feature was discernible. The kernel, when fresh, has a sweet, agreeable taste, and is eaten like chestnuts, either raw or roasted. It is also used as an ingredient of puddings, &c., and forms an excellent chocolate when ground with cocoa. By age it becomes rancid and loses its pleasant flavour. The black juice of the nut, and a milky juice which flows from the tree by incision, are sometimes used for marking linen, upon which they leave a nearly indelible brown or black stain.

ANAGALLIS ARVENSIS. *Scarlet pimpernel.* An annual plant, growing in Europe and this country, with small, delicate, procumbent stems, furnished with opposite branches, opposite ovate leaves, and small scarlet flowers, which are supported upon axillary, solitary peduncles, and appear in June and July. It is inodorous, and has a bitterish somewhat acrid taste. The ancients esteemed it as a counter-poison, and in modern times it has been used as a preventive of hydrophobia; but at present no faith is placed in its alexipharmic powers. It is, nevertheless, not wholly inactive; as Orfila found three drachms of an extract prepared from it sufficient to destroy a dog, with marks of inflammation of the bowels. It has been recommended as a local application in old and ill-conditioned ulcers, and has been given internally in visceral obstructions, consumption, dropsy, epilepsy, mania, &c. But too little is known of its precise properties, to authorize its indiscriminate employment in these complaints. Another species, considered by Linnæus as a mere variety of the A. arvensis, is the *A cærulea*, distinguished by its blue flowers. It is incorrectly designated by the older writers as the *female* plant, the former being called *male.* The medical properties of the two, so far as is known, are the same.

ANCHUSA OFFICINALIS. *Bugloss.* This species of Anchusa is a native of Europe, and unknown in the United States. It is a biennial plant, from one to three feet high, and was formerly much esteemed as a medicine. The root, leaves, and flowers, were all officinal. These are inodorous, and nearly tasteless. The root is mucilaginous and slightly sweetish, and the flowers very feebly bitter. The plant has no claim whatever to the credit, formerly attached to it, of possessing cordial and exhilarating properties. It was used by the ancients in hypochondriacal affections; but as it was given in wine, the elevation of spirits experienced may with propriety be ascribed to the vehicle. In France, the *Anchusa Italica*, which is there known as *buglosse*, is employed for the same purposes and in the same manner as the Borago officinalis.

ANDROMEDA ARBOREA. *Sorrel tree* A beautiful indigenous tree, growing in the valleys of the Alleghany mountains, from Pennsylvania to Florida. The leaves have a very pleasant acid taste, which has given rise to the common name of the tree. They are frequently used by hunters to allay thirst, and in decoction they form a grateful refrigerant drink in fevers.

The other species of Andromeda are shrubs, and some of them are ornamental. Dr. Barton, in his "Collections," states that a decoction of the *A. Mariana* is usefully employed, in the Southern States, as a wash in a disagreeable ulceration of the feet to which the Negroes are liable. The powder upon the leaves and buds of the *A. speciosa* is said to be a powerful errhine.

ANEMONE PRATENSIS. *Meadow anemone.* This plant enjoyed at one time considerable credit from the recommendation of Störck, who believed that he had found it useful in amaurosis and other complaints of the eye, in secondary syphilis, and in cutaneous eruptions. The *A. Pulsatilla*, an analogous species, has been employed for similar purposes; and favourable reports have been made of its efficacy in obstinate diseases of the skin, and in hooping-cough. The preparation employed was an extract of the herbaceous part of the plant, which was given by Störck in the dose of one or two grains daily, gradually increased to twenty grains or more. In large doses it was found frequently to produce nausea and vomiting, or griping and looseness of the bowels, and sometimes acted as a diuretic. The species of Anemone above mentioned are European plants, and are not cultivated in this country. We have several native species, which, however, are not employed. One of them, the *A. nemorosa*, which is common to Europe and the United States, is said to act as a poison to cattle, producing bloody urine and convulsions. It is stated also to have proved, when applied to the head, a speedy cure for tinea capitis. Most of the species are, in the recent state, acrid and rubefacient, resembling in this respect other Ranunculaceæ, to which family they belong.

ANIME. *Gum anime.* The substance known at present by the name of *anime*, is a resin supposed to be derived from the *Hymenæa Courbaril*, a tree of South America; though this origin is denied by Hayne, and is at least doubtful. It is in small, irregular pieces, of a pale lemon-yellow colour sometimes inclining to reddish, more or less transparent, covered with a whitish powder, brittle and pulverizable, with a shining fracture, a weak but agreeable odour, and a mild resinous taste. It softens in the mouth, adheres to the fingers when in the state of powder, and readily melts with heat, diffusing its agreeable odour in an increased degree. It consists of two distinct resins, one soluble, the other insoluble in cold alcohol, and of a small proportion of volatile oil. There is a variety of a darker colour, less transparent, and exhibiting small cavities in the interior; in other respects resembling the preceding. Another variety of anime is the East Indian, supposed to be derived from the *Vateria Indica;* but this never reaches us as a distinct article of commerce. Anime formerly entered into the composition of various ointments and plasters; but is now used only as incense, or in the preparation of varnishes. The Brazilians are said to employ it internally in diseases of the lungs.

ANNOTTA. *Orleana.* The colouring substance called *annotta*, *arnotta*, or *roucou*, is the reddish pulp surrounding the seeds in the fruit of the *Bixa Orellana*, a middling sized tree growing in Guiana, and other parts of South America. The pulp is separated by bruising the fruit, mixing it with water, then straining through a sieve, and allowing the liquid to stand till the undissolved portion subsides. The water is then poured off, and the mass which remains, having been sufficiently dried, is formed into flat cakes or cylindrical rolls, and sent into the market. Annotta is of a brownish-red colour, usually rather soft, but hard and brittle when dry, of a dull fracture, of a sweetish peculiar odour, and a rough, saline, bitterish taste. It is inflammable, but does not melt with heat. It softens in water, to which it imparts a yellow colour, but does not dissolve. Alcohol, ether, the oils, and alkaline solutions dissolve the greater part of it. The chief uses to which it is applied, are for dying silk and cotton orange-yellow, and for colouring cheese. The colour, however, which it imparts to cloth is fugitive. It has been given internally as a medicine; but is not now used, and probably exercises little influence upon the system. In pharmacy it is occasionally used to colour plasters, and has sometimes been substituted for saffron.

ANTIRRHINUM LINARIA. Linn. LINARIA VULGARIS, Lindley. *Common toadflax.* This species of Antirrhinum is a perennial herbaceous plant, from one to two feet high, with numerous narrow linear leaves, and a terminal crowded spike of large yellow flowers. It is a native of Europe, but has been introduced into this country, where it is now naturalized, and grows in great abundance along the road sides, throughout the Middle States. It is readily distinguishable by the shape of its leaf, and by its conspicuous yellow flowers, which appear in succession from June to October. The herb is the part used. It should be collected when in flower, dried quickly, and kept excluded from the air. When fresh it has a peculiar, heavy, rather disagreeable odour, which is in a great measure dissipated by drying. The taste is herbaceous, weakly saline, bitter, and slightly acrid. This plant is said to be diuretic and cathartic, and has been used in dropsy, jaundice, and various cutaneous eruptions. It is most conveniently employed in the state of infusion. The fresh plant is sometimes applied externally, in the shape of poultice or fomentation, to hemorrhoidal tumours; and an ointment made from the flowers has been used for the same purpose, and also as a local application in diseases of the skin.

AQUILEGIA VULGARIS. *Columbine.* A perennial herbaceous plant, indigenous in Europe, but cultivated in our gardens as an ornamental flower. All parts of it have been medicinally employed. The roots, leaves, and flowers have a disagreeable odour, and a bitterish, acrid taste. The seeds are small, black, shining, inodorous, and of an oleaginous sweetish taste, followed by a sense of acrimony. Columbine has been considered diuretic, diaphoretic, and antiscorbutic, and has been employed in jaundice, in small-pox to promote the eruption, in scurvy, and externally as a vulnerary. It is not used at present, and is even suspected to possess dangerous properties, like most other plants of the natural order of Ranunculaceæ to which it belongs.

ARECA NUT. *Betel nut.* This is the product of the Areca Catechu, an East India tree belonging to the family of palms. The fruit, which is about the size and shape of a small egg, and of an orange-yellow colour, contains the nut embedded in a fibrous fleshy envelope, and invested with a brittle shell which adheres to the exterior flesh. The kernel, which is the betel-nut of commerce, is of a roundish-conical shape, rather larger than a chestnut, externally of a deep brown, diversified with a fawn colour, so as to present a reticular appearance, internally brownish-red with whitish veins, very hard, of a feeble odour when broken, and of an astringent, somewhat acrid taste. It abounds in tannin, and contains also gallic acid, a fixed oil, gum, a little volatile oil, lignin, and various saline substances. It yields its astringency to water, and in some parts of Hindostan an extract is prepared from it having the appearance and properties of catechu. Immense quantities are consumed in the East, mixed with the leaves of the Piper Betel, and with lime, forming the masticatory so well known by the name of *betel.* The red colour which this mixture imparts to the saliva and the excrements, is owing to the Areca nut, which is also powerfully astringent, and by its internal use, tends to counteract the relaxation of bowels to which the heat of the climate so strongly predisposes. The nut is used in this country almost exclusively in the preparation of tooth-powder, for which purpose it is first reduced by heat to the state of charcoal. The superiority of this form of charcoal over that from other sources, is probably owing to the extreme hardness of its particles.

ASPARAGUS OFFICINALIS. *Asparagus.* This well known plant, so abundantly cultivated as a garden vegetable, is a native of Europe. It is perennial and herbaceous. The *root*, which is inodorous, and of a weak sweetish taste, was formerly used as a diuretic, aperient, and purifier of the blood; and is stated to be still employed to a considerable extent in France. It is given in the form of decoction, made in the proportion of one or two ounces of the root to a quart of water. Hayne asserts, that in the dried state it is wholly inert. The *young shoots*, as every one knows, are much used in spring as an article of diet. Before being boiled they have a disagreeable taste; and their juice was found by Robiquet and Vauquelin to contain a peculiar crystallizable principle, called *asparagin* (see p. 68.), which, however, is not known to exert any special influence on the system. The sprouts themselves are not without effect, as the urine acquires a disagreeable odour very soon after they have been eaten. They are considered by some writers as diuretic, aperient, and deobstruent, and as constituting a very wholesome and useful article of diet, early in the spring, when so few vegetables are to be obtained. Broussais thinks that they exert a sedative influence over the heart, and recommends them especially in hypertrophy and other diseases of that organ attended with excessive action, and without phlogosis of the stomach. M. Gendrin, however, after much experience with asparagus, affirms that he has never found it to exercise the slightest influence over the actions of the heart, and ascribes its palliative effects in diseases of that organ, to its diuretic action. From the experiments of M. Gendrin, it appears, that this medicine operates powerfully on the kidneys. He found it, in all the cases in which he administered it, to increase the quantity of urine, which in some instances was quintupled. The most convenient forms for exhibition are those of syrup and extract, prepared from the shoots. The former may be given in the dose of one or two fluidounces, the latter of half a drachm or a drachm. The syrup may be made by adding a sufficient quantity of sugar to the expressed juice of the shoots, previously deprived of its albumen by exposure to heat and by filtration; the extract, by evaporating the same juice to the consistence of a pilular mass. The *berries* are capable of undergoing the vinous fermentation, and affording alcohol by distillation. In their unripe state they possess the same properties with the shoots, and probably in a much higher degree. We have employed a syrup prepared from them, with apparent advantage, in a case of diseased heart.

ASPLENIUM FILIX FŒMINA, R. Brown. *Female fern.* This is the *Polypodium Filix fœmina* of Linn., the *Aspidium Filix fœmina* of Swartz, and the *Athyrium Filix fœmina* of Roth. It has a root analogous in character to that of the male fern (*Aspidium Filix mas*), and supposed to possess similar vermifuge properties. At present, however, it is not used. The vulgar name of *female fern* has also been bestowed upon the *Pteris aquilina*, or *common brake*, which is asserted by some authors to have the property of destroying the tape-worm. The leaves of two species of Asplenium, the *A. Trichomanes* or *common spleenwort*, and *A. Adiantum-nigrum*, or *black spleenwort*, are somewhat mucilaginous, and have been used as substitutes for the *Maidenhairs* (*Adiantum Capillus Veneris* and *A. pedata*) as pectorals, though destitute of the aromatic flavour, which is, perhaps, the chief recommendation of these plants.

BAPTISIA TINCTORIA. *Sophora tinctoria*, Linn. *Podalyria tinctoria*, Michaux. *Wild indigo.* This is an indigenous perennial plant, found in all parts of the United States, growing abundantly in woods and dry barren uplands. It is from one to three feet high, with a smooth, very branching stem, small, ternate, cuneate-obovate, bluish-green leaves, and yellow flowers, which appear in July and August, and, like the whole plant, become black when dried. The root, which is the part most highly recommended, is of a dark-brown colour, inodorous, and of a nauseous, somewhat acrid taste. Its virtues appear to reside chiefly in the cortical portion. In large quantities, it is said to operate violently as an emetic and cathartic; but in smaller doses, it produces only a mild laxative effect. Its general influence upon the system has not been accurately investigated. It is said to have proved useful in scarlatina, typhus fever, and in that state of system which attends gangrene or mortification. Dr. Thatcher speaks highly of its efficacy as an external application to obstinate and painful ulcers; and Dr. Comstock, of Rhode Island, found it extremely useful, both as an internal and external remedy, in threatened or existing mortification. By the latter physician it was given in decoction, made in the proportion of an ounce of the root to a pint of water, of which half an ounce was administered every four or eight hours, any tendency to operate on the bowels being checked with laudanum. It may be used externally in the form of decoction or of cataplasm. The stem and leaves are said to possess the same virtues with the root, though in a less degree. A pale blue colouring substance has been prepared from the plant as a substitute for indigo, but is greatly inferior.

BASSORA GUM. We are wholly ignorant of the plant which yields this substance. It came into commerce originally from the neighbourhood of Bassora, on the Gulf of Persia, but is frequently found mixed with gums brought from other countries, and is probably not the product of one plant exclusively. It is in irregular pieces, of various sizes, never very large, white or yellow, intermediate in the degree of its transparency between gum Arabic and tragacanth, inodorous, tasteless, and possessed of the property of yielding a slight sound when broken under the teeth. But a small portion of it is soluble in water, whether hot or cold. The remainder swells up considerably, though less than tragacanth, and does not, like that substance, form a gelatinous mass, as it consists of independent granules which have little cohesion. The soluble portion is pure gum, or as it is now sometimes named *arabin;* and, according to M. Guérin, constitutes 11.2 per cent. The insoluble portion consists of a peculiar principle called *bassorin*, associated with a small proportion of various saline substances, which yield, when the gum is burnt, 5.6 per cent. of ashes. The gum is useless both in medicine and pharmacy, and is described here only as an object to be avoided, and as affording a principle which enters into the composition of several officinal substances, and the nature of which, therefore, should be known.

Bassorin is insoluble in water, alcohol, and ether, but softens and swells up in hot or cold water. Diluted nitric and muriatic acids, with the aid of heat, dissolve it almost entirely. The acidulous solution, concentrated by evaporation and treated with alcohol, lets fall a flocculent precipitate which has all the characters of pure gum, into which the bassorin appears to have been converted by the action of the acid. This does not, however, constitute more than a tenth part of the bassorin dissolved. By gradually evaporating the alcoholic acidulous solution, a thick bitterish liquid is obtained, which exhales a strong odour of ammonia when treated with potassa. Strong nitric acid converts bassorin into mucic and oxalic acids; and, treated with sulphuric acid, it yields a sweet crystalline substance which is incapable of the vinous fermentation. (Guérin.) Vauquelin was the first to call attention to this principle, upon which he conferred its present name, from having first observed it in the Bassora gum. Bucholz afterwards discovered the same or a closely analogous principle in tragacanth; and John, a principle which was supposed to be the same, in the gum of the cherry tree; hence it has sometimes been called *tragacanthin* and *cerasin*. M. Guérin, however, has demonstrated that the insoluble principle of the cherry gum is essentially different from bassorin. Berzelius considers the latter as belonging to the class of substances which he associates together under the name of mucilage, and of which examples are furnished in the mucilages of flaxseed and of quince seed. For his views on this subject the reader is referred to the article Linum, in the Materia Medica.

BDELLIUM. A gum-resin brought from Arabia, or the neighbouring countries of the East, and said to be the product of the *Heudelotia Africana*. (*Journ. de Pharm.* xix. 250 and 312.) It sometimes comes mixed with gum Arabic and gum Senegal. It is either in small roundish pieces, of a reddish colour, semi-transparent, and brittle with a wax-like fracture, or in larger irregular lumps, of a dark brownish-red colour, less transparent, somewhat tenacious, and adhering to the teeth when chewed. Bdellium has an odour and taste like those of myrrh, but weaker. It is infusible, and inflammable, diffusing while it burns a balsamic odour. According to Pelletier it consists of 59 per cent. of resin, 9.2 of gum, 30.6 of bassorin, and 1.2 of volatile oil including loss. In medical properties it is analogous to myrrh, and was formerly used for the same purposes; but it is now scarcely ever given internally. In Europe it is still occasionally employed as an ingredient in plasters. The dose is from ten to forty grains.

BEAN OF SAINT IGNATIUS. *Faba Sancti Ignatii.* This is the product of the *Ignatia amara* of the younger Linnæus, which is now generally considered by botanists a species of Strychnos, and entitled *S. Ignatia.* (See *Nux Vomica.*) It is a tree of middling size, with numerous long, cylindrical, glabrous, vine-like branches, which bear opposite, nearly sessile, oval, pointed, entire, and very smooth leaves. The flowers are white, tubular, fragrant, and arranged in short axillary racemes. The fruit is of the size and shape of a pear, with a smooth, whitish, ligneous rind, enclosing about twenty seeds embedded in a dry pulpy matter, and lying one upon the other. These seeds are the part used. The tree is a native of the Philippine Islands, where the seeds where highly esteemed as a medicine, and having attracted the attention of the Jesuits, were honoured with the name of the founder of their order.

They are about an inch long, rather less in breadth, still less in thickness, convex on one side, obscurely angular with two, three, or four faces on the other, and marked at one end with a small depression indicating their point of attachment. They are externally of a pale brown colour, apparently smooth, but covered in fact with a short down or efflorescence, which may be removed by scraping them with a knife. They are somewhat translucent, and their substance is very hard and horny. They have no smell, but an excessively bitter taste. To Pelletier and Caventou they afforded the same constituents with the nux vomica, but a much larger proportion of strychnia. (See *Nux Vomica.*) One thousand parts contain twelve of this alkali.

MM. Magendie and Delile have proved that they act on the human system in the same manner as the nux vomica. In the Philippines they have been employed for the cure of obstinate intermittents, and in numerous other diseases. It is probable that in small doses they act as a tonic. In this country they are never employed; nor have they a place in the British Pharmacopœias. We have introduced them here on account of their comparatively large proportion of strychnia, which is triple that contained in the nux vomica. In France they are profitably employed for the extraction of this principle.

BERBERIS VULGARIS. *Barberry.* A shrub growing wild in Europe and the United States, and sometimes cultivated in gardens on account of its berries. These grow in loose bunches, are oblong and of a red colour, have a grateful, sour, astringent taste, and contain malic and citric acids. They are refrigerant, astringent, and antiscorbutic, and are sometimes used in Europe, in the form of drink, in febrile diseases and diarrhœas. An agreeable syrup is prepared from the juice; and the berries themselves are sometimes preserved for the table. The root and inner bark have been used for dyeing yellow, and are said to have been employed beneficially in jaundice. They owe their colouring property to a peculiar crystallizable principle, which has been denominated *berberin.* (*Journ. de Pharm.* xxi. 309.) It is a vulgar error to suppose that the vicinity of this plant is very injurious to wheat. The American plant differs slightly from the European, and is described by Pursh as a distinct species, under the name of *B. Canadensis.* It grows in mountains and hilly districts from Canada to Virginia. The berries are smaller and much less juicy than those of the garden barberry.

BETONICA OFFICINALIS. *Wood betony.* A perennial European herb, belonging to the natural order of labiate plants, the general properties of which it possesses in an inferior degree. It has a pleasant but feeble odour, and a warm, somewhat astringent, and bitterish taste. By the ancients it was very highly esteemed, and employed in numerous diseases; but it is at present little used. It appears to be slightly warming and corroborant, but is inferior in this respect to many other plants belonging to the same family. The root has been considered emetic and purgative.

BETULA ALBA. *Common European birch.* Various parts of this tree have been applied to medical uses. The *inner bark*, which is bitterish and astringent, has been employed in intermittent fever. The epidermis is separable into thin layers, which may be employed as a substitute for paper, and are applied to various economical uses. It contains a peculiar principle, called *betulin*, which may be separated by heat. This is in white, loose, cotton-like flakes, which are volatile, and when heated exhale a peculiar aromatic odour. When the bark is distilled, this principle is decomposed, and affords an empyreumatic volatile oil, having the peculiar odour of Russia leather, in the preparation of which it is employed. The *leaves*, which have a peculiar, aromatic, agreeable odour, and a bitter taste, have been employed in the form of infusion, in gout, rheumatism, dropsy, and cutaneous diseases. The same complaints, particularly dropsy, are said to have been successfully treated by enveloping the body in the fresh leaves, which thus applied excite perspiration. When the stem or branches of the tree are wounded, a sweet *juice* flows out, which is considered useful in complaints of the kidneys and bladder. In consequence of the sugar it contains, it is susceptible, upon the addition of yeast, of the vinous and subsequently of the acetous fermentation. A beer, wine, vinegar, and spirit are prepared from it, and habitually used in some parts of Europe.

Of the American species of birch, the *Betula lenta*, variously called *sweet birch, black birch, cherry birch*, aud *mountain mahogany*, is remarkable for the aromatic flavour of its bark and leaves, which have the odour and taste of the Gaultheria procumbens, and are sometimes used in infusion, as an agreeable, gently stimulant, and diaphoretic drink. This species also affords a saccharine liquor, which, indeed, appears to be common to all the birches. The bark of the *B. papyracea* very closely resembles that of the common European birch, and is much employed by the Northern Indians for making canoes. Thin layers of the epidermis may be advantageously placed inside of boots to prevent the access of moisture.

BEZOAR. This name has been applied to concretions which form in the stomach or intestines of animals, and which were at one time thought to possess extraordinary medical virtues. Numerous varieties have been noticed; but they were arranged in two classes, the *oriental bezoars* (*Lapis bezoar orientalis*), and *western bezoars* (*lapis bezoar occidentalis*), of which the former were most highly esteemed. They have fallen into merited neglect.

BIRD-LIME. A viscid substance existing in various plants, particularly in the bark of the *Viscum album*, and *Ilex aquifolium* or European holly, from the latter of which it is usually procured. The process for preparing it consists in boiling the middle bark for some hours in water, then separating it from the liquid, and placing it in proper vessels in a cool situation, where it is allowed to remain till it becomes viscous. It is then washed to separate impurities, and constitutes the substance in question. Bird-lime thus prepared is greenish, tenacious, of a glutinous consistence, of a bitterish taste, and of an odour analogous to that of flaxseed oil. Exposed to the air in thin layers it becomes dry, brown, and pulverizable, but reacquires its viscidity upon the addition of water. It consists of several proximate principles, but is thought to owe its characteristic properties to the presence of a peculiar substance, identical with that which exudes spontaneously from certain plants, and which has received the name of *glu* from the French chemists. This principle is without odour or taste, extremely adhesive, fusible by heat, inflammable, insoluble in water, nearly insoluble in alcohol, but dissolved freely by sulphuric ether, and the oil of turpentine. According to M. Macaire, it is insoluble in the fixed oils, either hot or cold. This property distinguishes it from the resins, to which Berzelius is disposed to attach it. M. Macaire proposes for it the name of *viscin*. (*Journ. de Pharm.* xx. 18). Bird-lime is so tenacious, that it may be employed to catch small birds, which, when they alight on a stick thickly covered with it, are unable to escape.

BOLE ARMENIAN. The term *bolus* or *bole* was formerly applied to various forms of argillaceous earth, differing in their colour, or place of origin. Thus we find mentioned, among others, the *Armenian, Lemnian*, and *French boles*, and the *red* and *white boles*. Some of these substances were so highly valued as to be formed into small masses and impressed with a seal, and hence received the name of *terræ sigillatæ*. They were all similar in effect, though the small proportion of oxide of iron contained in the coloured boles may have given them greater activity. The only one at present kept in the shops is that called *bole Armenian*, from its resemblance to the substance originally brought from Armenia. It is prepared by trituration and elutriation from certain native earths existing in different parts of Europe. It is in pieces of various sizes, of a reddish colour, soft and unctuous to the touch, adhesive to the tongue, and capable of mixing with water so as to form a paste. It consists chiefly of alumina and silica, coloured with oxide of iron. The boles were formerly employed as absorbent medicines and astringents; and they were undoubtedly useful in some cases of acidity of stomach and relaxed bowels; but they have been superseded by more active medicines. The *bole Armenian* is now used chiefly as an ingredient in tooth powders.

BORAGO OFFICINALIS. *Borage.* This is an annual, hairy, succulent European plant, one or two feet high, with fine blue flowers, on account of which it is sometimes cultivated in our gardens. All parts of it abound in mucilage, and the stem and leaves contain the nitrate of potassa with other saline ingredients. To these constituents the plant owes all its virtues. It is much used in France. An infusion of the leaves and flowers, sweetened with honey or syrup, is employed as a demulcent, refrigerant, and gently diaphoretic drink in catarrhal affections, rheumatism, diseases of the skin, &c. The expressed juice of the stem and leaves is also given in the dose of from two to four ounces. The flowers are sometimes applied externally as an emollient. A distilled water, extract, and syrup were formerly used, but have fallen into neglect. Borage is scarcely known in this country as a medicinal plant, and is altogether too feeble to merit much attention.

BRAZIL WOOD. A red dye-wood, the product of different species of Cæsalpina, growing in the West Indies and South America. Two varieties are known in commerce:— 1. the proper Brazil wood, said to be derived from the *Cæsalpina echinata*, and sometimes called *Pernambuco* or *Fernambuca wood*, from the province of Brazil where it is collected; 2. the *brasilleto*, produced by the *C. Braziliensis* and *C. Crista*, which grow in Jamaica and other parts of the West Indies. The former is the most highly valued. The *sappan* or *sampfen wood* may be referred to the same head, being obtained from the *Cæsalpina Sappan*, and possessing properties analogous to those of the brasilleto. The *Nicaragua* or *peach wood* is also analogous to the *brasilleto*, and is said by Bancroft to be derived from a species of Cæsalpina. It is produced in the East Indies. Brazil wood is nearly inodorous, has a slightly sweetish taste, stains the saliva red, and imparts its colouring matter to water. It was formerly used in medicine; but has been abandoned as inert. In pharmacy it sometimes serves to colour tinctures, &c.; but its chief use is in dyeing. A red lake is prepared from it, and it is an ingredient in a red ink.

BROMINE. *Brominum.* This is an elementary body, possessing many analogies to chlorine and iodine. It was discovered in 1826 by Balard, a chemist of Montpelier, in the bittern of sea-salt works, in which it exists as a bromide of magnesium. Since then it has been discovered in the waters of the ocean, in certain marine animals and vegetables, in numerous salt springs, both in Europe and America, and in two instances in the mineral kingdom—in an ore of zinc, and in the cadmian of Silesia. In the United States it was first discovered by Professor Silliman, who found it in the bittern of the salt works at Salina, in the State of New York, where it exists apparently in considerable quantities. It has been detected also in the waters of the Saratoga Springs, and by Professor Emmet of the University of Virginia, in the Kenhawa water.

Preparation. Pass a current of chlorine through bittern, and then agitate it strongly with a portion of ether. The chlorine decomposes the bromide of magnesium, forming a chloride of magnesium, and disengaging the bromine, which dissolves in the ether and communicates to it a hyacinth-red colour. Decant the ethereal solution of bromine, and treat it with a concentrated solution of caustic potassa. The alkali is converted into bromide of patassium and bromate of potassa, while the ether loses its colour and becomes pure, and may be employed anew in dissolving fresh portions of bromine. Having in this way obtained a sufficient quantity of the salts above mentioned, their solution is evaporated to dryness, and the dry mass calcined at a red heat to convert the bromate of potassa into the bromide of potassium. Next decompose the bromide by distilling it with sulphuric acid and the peroxide of manganese, from a retort furnished with a bent tube, plunging into water contained in a bottle. The acid combines with potassium and oxygen so as to form sulphate of potassa, and the liberated bromine distils over, and condenses under the water.

Properties. Bromine is a liquid of a dark red colour when viewed in mass, but hyacinth-red in thin layers. Its taste is very caustic, and its smell powerful and disagreeable, having some resemblance to that of chlorine. Its density is very nearly 3. At — 4° it becomes a hard, brittle, crystalline solid, having a dark leaden colour, and a lustre nearly metallic. It boils at about 117°, forming a reddish vapour, resembling that of nitrous acid, and of the sp. gr. 5.39. It evaporates readily, a single drop being sufficient to fill a large flask with its peculiar vapour. This vapour extinguishes flame, but previously communicates to it a greenish colour at its base, and a red one above.

Bromine is sparingly soluble in water to which it communicates an orange colour, but is very soluble in alcohol, and especially in ether. The alcoholic and ethereal solutions lose their colour in a few days and become acid from the generation of hydrobromic acid. It bleaches vegetable substances like chlorine, and decomposes organic matters, such as wood, cork, resins, volatile oils, &c. Its combination with starch has a yellow colour. It corrodes the skin and gives it a deep yellow stain.

Bromine is intermediate in its affinities between chlorine and iodine; since its combinations are decomposed by chlorine, while in its turn, it decomposes those of iodine. Its equivalent number is 78.4. It forms acids with oxygen and hydrogen, called bromic and hydrobromic acids, which are analogous both in properties and composition to the corresponding compounds of chlorine and iodine. In testing for bromine in mineral or saline waters, the water is evaporated in order to crystallize most of the salts. The solution, after having been filtered, is placed in a narrow tube, and a few drops of strong liquid chlorine are added. If this addition produces an orange colour, bromine is present. The water, in order that the test may succeed, must be free from organic matter, and the chlorine not added in excess.

Medical Properties. Bromine, from its analogy to iodine, was early tried as a remedy; and the results of these trials have demonstrated its value as a therapeutic agent in certain forms of disease. It probably acts like iodine, by stimulating the lymphatic system and promoting absorption, but is generally supposed to possess more energy. By Magendie it has been employed chiefly as a remedy for scrofula, as an emmenagogue, and in hypertrophy of the ventricles. This physician recommends its employment in cases, in which iodine does not operate with sufficient activity, or has lost its effect by habit. It has been employed in aqueous solution, and in the form of the bromides of potassium, iron, and mercury. The dose of the aqueous solution, containing one part of bromine to forty of distilled water, is about six drops taken in the course of the day The bromide of potassium may be given to the extent of twelve grains in 24 hours, dissolved in three or four fluidounces of water, sweetened with syrup. The dose of the bromide of iron is a grain, given twice a day, in the form of pill made up with conserve of roses and gum Arabic. This bromide is obtained by heating, under water, equal parts of bromine and iron filings. When the liquid becomes greenish, it is filtered and evaporated to dryness; and the dry mass, again dissolved and evaporated to dryness, gives the bromide. Bromide of iron is a brick-red deliquescent salt, very soluble and extremely styptic. Mercury forms two bromides, a proto and deutobromide. The latter is a corrosive poison, and requires to be given in minute doses. It may be employed in ethereal solution, made by dissolving a grain in a drachm of ether, of which ten, fifteen, or twenty drops may be given daily. For frictions the ointment of bromide of potassium is generally used, made with 34 grains of the salt to the ounce of lard. Of this from half a drachm to a drachm may be rubbed into a scrofulous tumour once in 24 hours. See Magendie's Formulary—Eighth Ed., 1835.

Bromine in an overdose acts as a poison. Its most poisonous combination is perhaps the deutobromide of mercury, for which, as for the deutochloride of the same metal, the best antidote is albumen.

CAHINCA. Though not admitted into the Pharmacopœias, this medicine has recently attracted so much attention as to have just claims to notice in the present work. We prefer the title *Chiococca*, as conforming with the nomenclature of the U. S. Pharmacopœia, which, as a general rule, designates particular vegetable remedies by the name of the genus or species to which the plants producing them belong. *Cahinca* or *caïnca* is a term which has passed into common use from the language of the Brazilian Indians. The Portuguese of Brazil call the medicine *raiz pretta* or black root. When first noticed in Europe, it was supposed to be derived from the *Chiococca racemosa* of Linnæus, which was known to botanists as an inhabitant of the West Indies. But Martius, in his "Specimen Materiæ Medicæ Brasiliensis," describes two other species of Chiococca, the *C. anguifuga* and the *C. densifolia*, which afford roots having the properties of that ascribed to the *C. racemosa;* and as the medicine is brought from Brazil, not from the West Indies, there is reason to believe that it is really derived from one or both of the plants named by that botanist. A. Richard, however, informs us that he has received from more than one source in Brazil, specimens of the *C. racemosa* as the cahinca plant; and it is not impossible that the roots of the three species possess identical properties and are indiscriminately used.

The cahinca root, as found in French commerce, is described by M. Achille Richard in the following terms. "It is of a reddish-brown colour, and consists of cylindrical branches, two or three feet long, of the thickness of a quill or smaller, occasionally putting forth slender and branching fibres, obscurely striated longitudinally, presenting at certain distances small irregular tubercles, and here and there transverse fissures produced by drying. These branches are composed of a very thin whitish bark, covered externally with an adhering brown epidermis, and of an internal ligneous centre, which forms almost the whole mass of the root. The cortical portion, which is of a resinous character, has a bitter disagreeable taste, somewhat acrid and astringent; the ligneous part is quite tasteless. Together with the pieces just described, others are sometimes found, derived either from the branches of the stem above ground, or from those which run along the ground and have taken root. They are distinguishable from the true root by being straighter and more regular, and presenting a medullary canal in their centre. The taste of their cortical portion is much weaker, and they are probably less active." *Elem. d'Hist. Nat. Med.* ii. 331.

A specimen brought into our market as the cahinca, consisted of cylindrical pieces, varying in size from the thickness of a straw to that of the little finger, somewhat bent or contorted, slightly wrinkled longitudinally, with occasional small asperities, internally ligneous, externally covered with a thin brittle reddish-brown bark, having a light brown or brownish ash-coloured epidermis. The virtues of the root reside almost exclusively in the cortical portion. They are extracted by water and alcohol. Cahinca has been analyzed by several chemists. Four distinct principles were discovered in it by Pelletier and Caventou:—1. a crystallizable substance, in which all the bitterness of the root resides; 2. a green fatty matter of a nauseous odour; 3. a yellow colouring matter; and 4. a coloured viscid substance. The crystallizable principle appears to be that in which the medical virtues reside. Under the belief that it is essentially acid, its discoverers have named it *cahincic acid.* It is white, without smell, of a taste at first scarcely perceptible, but afterwards extremely bitter, and slightly astringent, of difficult solubility in water, but readily soluble in alcohol, permanent in the air, and unaltered at the temperature of boiling water. It reddens vegetable blues, and unites with the alkalies, but does not form crystallizable compounds. The form in which it exists in the root is thought to be that of a sub-cahincate of lime.

Medical Properties. Cahinca is tonic, diuretic, purgative, and emetic. In moderate doses it gently excites the circulation, increases the discharge of urine, and produces evacuations from the bowels; but is rather slow in its operation. Like most other diuretics, it may be so administered as to prove diaphoretic, by keeping the skin warm, using warm drinks, and counteracting its purgative tendency. In some patients it occasions nausea and griping pains in the bowels, and in very large doses always acts powerfully both as an emetic and cathartic. In Brazil it has long been used by the natives as a remedy for the poisonous effects resulting from the bites of serpents; and its Indian name is said to have been derived from this property. According to Martius, the bark of the fresh root is rubbed with water till the latter becomes charged with all its active matters; and the liquid, while yet turbid, is taken in such quantities as to produce the most violent vomiting and purging, preceded by severe spasmodic pains. Patrick Brown speaks of the root of the *C. racemosa* as resembling seneka in taste, and as very useful in obstinate rheumatisms. But the virtues of cahinca in dropsy, though well known in Brazil, were first communicated to the European public in the year 1826, by M. Langsdorff, Russian Consul at Rio Janeiro. Achille Richard afterwards published a few observations in relation to it in the *Journal de Chimie Medicale;* and within a few years the medicine has been noticed, and its properties investigated by numerous practitioners. M. François of Paris has contributed more than any other physician to its present reputation as a cure for dropsy. By this gentleman it is considered superior to all other remedies in hydropic complaints. General experience appears to be decidedly in its favour, but by no means to the extent of the partial estimate of Dr. François. The root may possibly take a place among the standard diuretics, but is equally obnoxious with most others to the charge of uncertainty. It may be employed in substance, decoction, extract, or tincture. The powdered bark of the root may be given as a diuretic and purgative, in a dose varying from a scruple to a drachm; but in this form the remedy is considered very uncertain. The aqueous extract is usually preferred. The dose of this is from ten to twenty grains. An extract is also prepared with diluted alcohol, and given in the same dose. Dr. François recommends that in the treatment of dropsy, a sufficient quantity should be given at once to produce a decided impression, which should afterwards be maintained by smaller doses, repeated three or four times in the twenty-four hours.

CALENDULA OFFICINALIS. *Marygold.* This well known garden plant was formerly much employed in medicine. It has a peculiar, rather disagreeable odour, which is lost by drying, and a bitter, rough, saline taste. Among its constituents is a peculiar principle, called *calendulin,* discovered by Geiger most abundantly in the flowers, and considered by Berzelius as analogous to bassorin, though soluble in alcohol. The plant was thought antispasmodic, sudorific, deobstruent, and emmenagogue, and was given in low forms of fever, scrofula, jaundice, amenorrhœa, and various other complaints. Both the leaves and flowers were used; but the latter were preferred, and were usually administered in the recent state, in the form of tea. An extract was also prepared, and employed with supposed advantage in cancerous and other ulcers, sick stomach, &c. At present marygold is very seldom if ever used in regular practice.

CALOTROPIS GIGANTEA. Brown. *Asclepias gigantea*, Linn. Under the name of *madar*, or *mudar*, the bark of the root of this, and perhaps other analogous plants, has been employed in the East Indies, with great asserted advantage, in numerous complaints. The plant is a native of Hindostan, and has been introduced into the West Indies, where it is now naturalized. The bark, as employed, is destitute of epidermis, of a whitish colour, nearly or quite inodorous, and of a bitter, somewhat nauseous taste. It appears to have the general properties of many other acrid medicines; in small doses, increasing the secretions, and in larger, producing nausea and vomiting. According to Dr. Cassanova, who published an essay upon the subject at Calcutta, it is more especially directed to the skin, the capillaries and absorbents of which it stimulates to increased action. It is chiefly recommended as a remedy in the obstinate cutaneous diseases of tropical climates, such as elephantiasis and leprosy. It has been employed also with advantage in syphilis, dropsy, rheumatism, and hectic fever. It is administered in substance in the dose of from three to twelve grains, three times a day, and gradually increased till it affects the system.

CAM WOOD. A red dye-wood, procured from the *Baphia nitida* of De Candolle, a leguminous tree, growing on the Western Coast of Africa. The wood is usually kept in the shops in the ground state.

CANARY SEED. The seeds of the *Phalaris Canariensis*, an annual plant, belonging to the family of grasses, originally from the Canary Islands, but now growing wild in Europe and the United States, and cultivated in many places. The seeds are ovate, somewhat compressed, about two lines long, shining and of a light yellowish-gray colour externally, and brownish within. Their chief constituent is starch. They were formerly esteemed medicinal, but are not now employed unless for the formation of emollient cataplasms. They are nutritive, and their meal is said to be mixed, in some places, with wheat flour, and made into bread. They are much used as food for Canary birds.

CANNABIS SATIVA. *Hemp.* An annual plant, originally from Asia, but now cultivated in various parts of Europe and North America. The *leaves* are possessed of narcotic properties, and are employed in Persia and the East Indies, in the form of infusion, as an intoxicating drink. They are also smoked, in these and other countries of the East, for the same purposes as tobacco, with which they are frequently mixed. An extract prepared from them is said to produce effects analogous to those of opium. Even the odour of the fresh plant is stated to be capable of producing vertigo, headach, and a species of intoxication. The *seeds* have been used in medicine. They are about the eighth of an inch long, roundish-ovate, somewhat compressed, of a shining gray colour, inodorous, and of a disagreeable, oily, sweetish taste. They contain a considerable quantity of fixed oil, which is separated by expression, and used to some extent in the arts. They contain also uncrystallizable sugar and albumen, and when rubbed with water afford an emulsion, which may be used advantageously in inflammatory affections of the mucous membranes, though it is not superior to a similar preparation from other emulsive seeds. They are much used as food for birds, which are fond of them. It is, however, for the fibrous bark of hemp, and the various products manufactured from it, that the plant is chiefly cultivated.

CAOUTCHOUC. *Gum elastic.* The substance known by this name in commerce is the concrete juice of the *Siphonia Cahuchu* of Schreber and Willdenow, identical with the *Siphonia elastica* of Persoon, the *Jatropha elastica* of the younger Linnæus, and the *Hevea Guianensis* of Aublet. This is a large tree growing in Brazil, Guiana, and probably also in Central America. (*Journ. Phil. Col. of Pharm.* iii. 292.) On being wounded it emits a milky juice, which concretes on exposure, and constitutes the substance in question. A similar product is afforded by several other lactescent plants; but the juice of the Siphonia alone is extensively collected for use. Caoutchouc comes to us in different forms, sometimes in large flat pieces, sometimes in the shape of various animals, but usually in that of small flasks. These are formed by applying successive layers of the juice upon models of clay, which are broken and removed when the coating has attained a sufficient thickness and consistence. In the drying of these layers they are said to be exposed to smoke, which gives to the concrete mass a blackish colour. The juice, when it concretes by exposure to the air, assumes on the outer surface a yellowish-brown colour, while the mass remains white or yellowish-white within. The recent juice is not a pure proximate principle; but contains, according to Faraday, 1.9 per cent. of vegetable albumen, traces of wax, 7.13 per cent. of a bitter azotized substance soluble in water and alcohol, 2.9 of a substance soluble in water but insoluble in alcohol, 56.37 of water with a little free acid, and only 31.7 of the pure elastic principle to which chemists have given the name of caoutchouc. Some of these principles exist also in greater or less proportion in the concrete juice, which, as it reaches us, is usually contaminated with the soot derived from the smoke used in drying it. *Pure caoutchouc* is nearly colourless, and in thin layers transparent. It is highly elastic, lighter than water, without taste and smell, fusible at about 248°, remaining unctuous and adhesive upon cooling, inflammable at a higher temperature, insoluble in water, alcohol, the weak acids, and alkaline solutions, soluble in ether when entirely freed from alcohol, soluble also in most of the fixed and volatile oils, though at the expense of its elasticity. It is said, however, that the oils of lavender and sassafras dissolve it without change, and that when precipitated by alcohol from its solution in cajuput oil, it is still elastic. It is not affected by common air, chlorine, muriatic or sulphurous acid gas, nor by ammonia. It consists, according to Faraday, of 87.2 parts of carbon, and 12.8 of hydrogen.

Caoutchouc is used for erasing pencil marks; in the formation of flexible tubes for the laboratory, and of catheters and bougies for surgical purposes; in the melted state, as a luting to the joints of chemical apparatus; in the shape of thin layers, for covering the mouths of bottles, and for other purposes in which the exclusion of air and moisture is requisite; in the manufacture of water-proof cloth; and for numerous other objects, to which its elasticity, and the resistance which it offers to the ordinary solvents and to other powerful chemical agents peculiarly adapt it. Every one is aware of the highly important application which has recently been made of caoutchouc to the manufacture of water-proof shoes. It is most conveniently brought to the state of thin layers, in which it may often be used advantageously by the chemist and apothecary, by softening the small flasks in ether containing alcohol, or by boiling them in water for fifteen minutes, and then distending them by means of air forced into them. Tubes of caoutchouc may be made from its ethereal solution, or from the juice imported in the liquid state.

CAPPARIS SPINOSA. *Caper-bush.* A low, trailing shrub, growing in the South of Europe and North of Africa. The buds or unexpanded flowers, treated with salt and vinegar, form a highly esteemed pickle, which has an acid burning taste, and is considered useful in scorbutic affections. The dried bark of the root was formerly officinal. It is in pieces partly or wholly quilled, about one-third of an inch in mean diameter, transversely wrinkled, grayish externally, whitish within, inodorous, and of a bitterish, somewhat acrid and aromatic taste. It is considered diuretic, and was formerly employed in obstructions of the liver and spleen, amenorrhœa, and chronic rheumatism.

CARANNA. *Gum caranna.* A resinous substance, in pieces of a blackish-gray colour externally, dark-brown internally, somewhat shining and translucent, brittle and pulverizable when dry, but, in the recent state, soft and adhesive like pitch, easily fusible, of an agreeable balsamic odour when heated, and of a bitterish resinous taste. (*Geiger.*) It is said to be derived from the *Amyris Carana* of Humboldt, a tree growing in Mexico and South America. Geiger refers it also to the *Bursera gummifera* of the West India Islands; but the resin obtained from this tree is described by the French writers under the name of *resine de Gomart* or *resine de chibou ou cachibou*, and is said to bear a close resemblance to the resin *tacamahac.*

CATALPA CORDIFOLIA. *Bignonia Catalpa.* Linn. *Catalpa tree*, or *Catawba tree.* This is a beautiful flowering tree, growing wild in this country, and occasionally cultivated for ornamental purposes. It has been introduced into the gardens of Europe. It is commonly reputed to possess poisonous properties. The seeds have been advantageously employed by several practitioners of Continental Europe in asthma. M. Automarchi recommends a decoction made by boiling twelve ounces of water with three or four of the seeds down to six ounces, the whole to be given morning and night. (*Journ. of the Phil. Col. of Pharm.* vi. 352.)

CEANOTHUS AMERICANUS. *New Jersey tea. Red root.* A small indigenous shrub, growing throughout the United States. The root is astringent, and imparts a red colour to water. It is said to be useful in syphilitic complaints, in which it is given in the form of decoction, made in the proportion of two drachms of the root to a pint of water. Schoepf states that it is purgative. The leaves were used during the revolutionary war as a substitute for tea. Dr. Hubbard, in a communication to the Boston Medical and Surgical Journal, (Sept. 30th, 1835,) speaks very highly of the use of the Ceanothus as a local application in aphthous affection of the mouth and fauces, and in the sorethroat of scarlatina, and as an internal remedy in dysentery. He used a strong infusion of the dried leaves and seeds.

CHÆROPHYLLUM SATIVUM. *Chervil.* An annual European plant, cultivated in gardens as a pot-herb, and supposed by some physicians to possess medicinal powers. It has a strong agreeable odour, especially when rubbed, and a pungent slightly bitterish taste. These properties it owes to a volatile oil, which may be separated by distillation with water. It is said to be deobstruent, diuretic, and emmenagogue, and has been recommended by different authors in consumption, scrofula, dropsy, cutaneous and scorbutic affections, and as an external application to swollen breasts, bruises, and other local complaints or injuries. It is, however, a very feeble remedy, and is more employed as an addition to broths than as a medicine.

CHELIDONIUM MAJUS. *Celandine.* A perennial herbaceous plant, growing wild in this country, about old houses and in rocky places; but supposed to have been introduced from Europe, where it is indigenous. It is one or two feet high, bears pinnate leaves and small peduncled umbels of yellow flowers, and, when wounded, emits a yellow, opaque juice. It was employed by the ancients, and is occasionally used in modern practice, but little on this side of the Atlantic. The whole plant is used. It has a faint unpleasant odour, and a bitter, acrid, durable taste, which is stronger in the roots than in the leaves. The odour is nearly lost by drying, but the taste remains. The yellow juice is bitter and exceedingly acrid, and when applied to the skin produces inflammation and even vesication. The plant, analyzed by MM. Chevallier and Lassaigne, afforded a bitter resinous substance of a deep yellow colour; a kind of gum-resin of an orange-yellow colour, and bitter, nauseous taste; mucilage; albumen; and various saline substances, besides free malic acid and silica. Celandine is an acrid purgative, possessed also of diuretic, and perhaps diaphoretic and expectorant properties. In over doses, it produces unpleasant effects, and is by some considered poisonous. By the ancients it was much esteemed as a remedy in jaundice: and it has been found useful in the same complaint by some modern physicians. It was the chief ingredient of the old *decoctum ad ictericos* of the Edinburgh Pharmacopœia. It has been given also, with asserted advantage, in various other complaints, especially those of a scrofulous character, affecting the mesenteric and lymphatic glands, the skin, and the eyes. The yellow juice is often applied, in domestic practice, to corns and warts, which it destroys by stimulating them beyond their vital powers. The dose of the dried root or herb is from thirty grains to a drachm, that of the fresh root one or two drachms; and the same quantity may be given in infusion. The watery extract and the expressed juice have also been employed. The dose of the former is from five to ten grains, that of the latter from ten to twenty drops. In each case, the dose is to be gradually increased, until the effects of the remedy are experienced.

CHELTENHAM SALT, ARTIFICIAL. Several artificial mixtures have been prepared, professing to be exact imitations of the saline ingredients in the chalybeate Cheltenham water; but the only one which appears worthy of confidence, is that prepared by Robert Alsop, Chemist, of London. The composition of the natural Cheltenham chalybeate is given at p. 103, under the head of *Aqua.* The imitation of Mr. Alsop, as analyzed by Mr. Faraday, contains the same solid and gaseous contents as the natural water, except the sulphate of lime, which is very properly omitted; and in the same proportions precisely, with the exception that there is about twice as much free carbonic acid in the artificial preparation. The iron is present in the state of protoxide, and is immediately dissolved by the free carbonic acid, upon adding a sufficient quantity of water to the mixed salts. The free carbonic acid probably exists as such in the dry mixture; as there is no obvious agent present to cause it to be disengaged in the mere act of solution.

This saline mixture is in the form of a white powder, possessing a saline and slightly ferruginous taste. It is put up in bottles of two sizes, the smaller containing two and a half ounces, or sufficient to make thirty doses of forty grains each. It forms a good combination, in which the aperient property of the salts present is combined with the tonic virtue of the iron. It is considered to be useful in glandular obstructions, especially of the liver, and in scrofulous affections, attended with feeble digestion, sluggish bowels, and pallidness of skin. It is employed also, with advantage, in sick headach, habitual costiveness, and hemorrhoids. The dose is a teaspoonful, quickly dissolved in half a pint of cold water, and swallowed immediately, before the iron has time to separate in an insoluble state. This quantity may be taken in the morning fasting, and repeated once or twice after an interval of twenty minutes, or in the course of the day. To obtain its full tonic and alterative effects, it should be persevered in for a month or six weeks.

CHLORIDE OF LIME. *Oxymuriate of Lime. Bleaching Powder. Calcis Chloridum.* This compound is introduced here on account of its importance as a medicinal and disinfecting agent. It was first prepared, and brought into notice as a bleaching agent, in 1798, by Mr. Tennant of Glasgow. Since that time, ample experience has proved it to be the most convenient combination, by means of which the manufacturer can avail himself of the bleaching powers of chlorine gas; and accordingly vast quantities of it are at present prepared in different countries in which bleaching operations are conducted on an extensive scale.

Preparation. Chloride of lime may be easily prepared on a small scale, by passing a stream of chlorine through the pulverulent hydrate of lime, as long as it continues to be absorbed. On a large scale it is made by means of a great variety of apparatus, but the following, employed at Glasgow, is, according to Dr. Ure, the simplest and best. A large chamber is constructed eight or nine feet high, built of siliceous sandstone, the joints being secured by a cement of pitch, rosin, and dry gypsum. At one end it is furnished with an air-tight door, and on each side, with a glass window, to enable the operator to inspect the process during its progress. The slaked or hydrated lime is sifted and placed on wooden trays, eight or ten feet long, two feet broad and one inch deep. These are piled up within the chamber to the height of five or six feet on cross-bars, which, by keeping them about an inch asunder, favour the circulation of the gas over the lime.

The chlorine is generated in vessels nearly spherical, composed either entirely of lead, or the upper half of lead, and the lower half of iron. The vessel, when all of lead, has its lower two-thirds enclosed in a leaden or iron case, leaving an interstice of two inches in width, intended to receive steam for the purpose of producing the requisite heat. When of the other construction, the iron hemisphere has cast round its outer edge a groove, in which the lower edge of the leaden hemisphere rests, and is secured by Roman cement. The heat, in this case, is applied by exposing the bottom of the iron vessel directly to a gentle fire. In the leaden hemisphere are four apertures. The first is about ten or twelve inches square, and is closed by a leaden valve, the incurvated edges of which rest in a groove which is on the margin of the opening and filled with water: this aperture is intended to facilitate the adjustment of any interior derangement of the apparatus. The second aperture is in the centre of the top, and receives a tube which descends nearly to the bottom, and through which a vertical stirrer passes, intended to mix the materials, and furnished at the lower end with horizontal cross-bars of iron, or of wood sheathed with lead. A rotary motion is given to the stirrer, either by a winch turned by hand, or by steam or water power. The third opening admits a syphon-shaped funnel, through which the sulphuric acid is introduced, and the fourth is connected with a pipe intended to lead off the gas.

The pipes passing from the different generating vessels all terminate under water contained in a leaden chest or cylinder, where the gas, by passing through this liquid, is washed from muriatic acid. From this intermediate vessel, the chlorine finally passes, by means of a pretty large leaden pipe, through the ceiling of the chamber containing the lime. The process of impregnation generally requires to be continued four days, in order to form a good bleaching powder. If the process be hastened, heat will be generated, which will favour the production of muriate of lime, attended with a proportional diminution of the chloride.

The proportions of the materials employed for generating the chlorine vary in different manufactories. Those generally adopted, are 10 cwt. of salt, mixed with from 10 to 14 cwt. of peroxide of manganese; to which are added, in successive portions, from 12 to 14 cwt. of strong sulphuric acid, diluted before being used until its sp. gr. is reduced to about 1.65, which will be accomplished by adding about one-third of its weight of water. In manufactories in which sulphuric acid is also made, the acid intended for this process is brought to the sp. gr. of 1.65 only, whereby the expense of further concentration is saved.

The nature and composition of chloride of lime are not well settled. From the analyses which we possess, it appears very variable in quality, containing more or less loosely combined chlorine. From the results of Dr. Ure, it may be inferred, that, in the commercial samples of this compound, the chlorine is combined with between three and four times its weight of hydrate of lime. Hence it is easy to make a rough calculation of the quantity of the chloride which should result from the use of a ton of common salt. In this quantity of salt there are six-tenths of a ton of chlorine, which, if combined with three times its weight of hydrated lime, would furnish two and four-tenths of a ton of the compound. But in practice, the manufacturer gets only a ton and a half of good bleaching powder by the use of a ton of rock salt, instead of the quantity above indicated. The deficit arises, in a great degree, from the unavoidable loss of chlorine, both from its imperfect liberation from the salt, and from its waste in the combining chamber; but it is probably greater than it would be, if science directed the operation.

The mode in which chloride of lime is manufactured in this country, corresponds, in the general outline, with that pursued in Scotland, as above described.

Properties. Chloride of lime is a dry grayish-white pulverulent substance, possessing a hot penetrating taste, and a feeble odour of chlorine. When perfectly saturated with chlorine, it dissolves almost entirely in water; but as ordinarily prepared, a large proportion is insoluble, consisting of hydrate of lime, containing a small portion of chlorine. When exposed to heat it gives out oxygen and a little chlorine, and is converted into chloride of calcium. By the action of acids, however, the chlorine is disengaged, and hence this addition gives activity to the substance as a bleacher and disinfector. By exposure to the air it absorbs moisture and deteriorates, being converted in part into muriate, at the expense of the chloride of lime. When moist, it is of inferior quality, as this circumstance indicates the presence of muriate of lime.

As chloride of lime is very variable in its quality, it becomes important to possess the means of testing its value. Welter proposed for this purpose a weak solution of indigo in sulphuric acid. It is used by observing what proportion of a solution obtained from a given weight of the chloride is necessary to discharge the colour of a solution of indigo of a determinate strength; and the value of the sample is inversely as this quantity. Of course, in making comparative experiments of this kind, care must be taken that the sulphate of indigo is of uniform strength, and that the solution obtained from the different samples of chloride is made under similar circumstances. Another test, which was proposed by Mr. Dalton, is to add a solution of the bleaching powder to one of protosulphate of iron until the smell of chlorine is perceived; and the value of the sample will be in proportion to the smallness of the quantity of the solution, necessary to produce this effect. Dr. Thomson reports, that Mr. Crum, a practical chemist of Glasgow, finds this method exact in its indications.

Composition. Notwithstanding the bleaching powder has been studied by a number of able chemists, its composition is still involved in doubt. At first it was asserted to be a compound of one equivalent of chlorine with two of lime in the state of hydrate. Dr. Ure contends that the lime and chlorine are united in variable proportions, not correspondent to equivalent quantities; but Dr. Thomson asserts that the compound has been so much improved in quality of late years, that good specimens are almost entirely soluble in water, and consist of one equiv. of chlorine 35.42, and one equiv. of lime 28.5 = 63.92. Berzelius, however, takes a different view of the composition of this compound. He considers it to be a combination of tritoxide of chlorine, which he calls *chlorous* acid, with lime. According to this view, then, it is a *chlorite of lime.*

Medical Properties and Uses. Chloride of lime is a powerful disinfecting agent, and has been used with advantage in solution as an application to ill-conditioned ulcers, burns, and cutaneous eruptions, as a gargle in putrid sorethroat, and as a wash for the mouth to disinfect the breath, and for ulcerated gums. As it occurs of variable quality in commerce, and must be used in solution more or less dilute according to the particular purpose to which it is to be applied, it is impossible to give any very precise directions for its strength as a therapeutical agent. From one to four drachms of the powder added to a pint of water and filtered, will constitute a solution within the limits of strength ordinarily required. For the cure of itch, M. Derheims has recommended a much stronger solution—three ounces of the chloride to a pint of water, the solution being filtered, and applied several times a day as a lotion. When applied to ulcers, their surface may be covered with lint dipped in the solution. This preparation acts, without doubt, by means of the chlorine which it contains; but is not so eligible, perhaps, for external use or internal exhibition, as the compound of analogous constitution, called *chloride of soda.* (See the next article.)

In consequence of its powers as a disinfector, chloride of lime is a very important substance in its application to medical police. It possesses the extraordinary property of preventing or arresting animal and vegetable putrefaction, and of destroying pestilential and infectious miasms. It is consequently applicable to a great variety of purposes, more or less connected with the health or comfort of communities. It may be used with advantage for preserving bodies from exhaling an unpleasant odour before interment in the summer season. In juridical exhumations, its use is indispensable, as it effectually removes the disgusting and insupportable fetor of the corpse. The mode in which it is applied in this case, is to envelop the body with a sheet completely wet with a solution, made by adding about a pound of the chloride to a bucketful of water. It is employed also for disinfecting dissecting rooms, privies, common sewers, docks, and other places which exhale offensive effluvia. In destroying contagion and infection, it also appears to be highly useful. Hence hospitals, alms-houses, jails, ships, &c., may be purified by its means. In short, all places which may be deemed infectious, from having been the receptacle of cases of virulent disease, may be more or less disinfected by its use, after they have undergone the ordinary processes of cleansing.

The way in which chloride of lime acts, is exclusively by means of its chlorine, which, being loosely combined, is disengaged by the slightest affinities. All acids, even the carbonic, disengage it; and as this acid is a product of animal and vegetable decomposition, noxious effluvia furnish the means, to a certain extent, of their own disinfection by this chloride. But the stronger acids disengage the chlorine far more readily; and among these, sulphuric acid is the cheapest and most convenient. Accordingly the chloride of lime may be dissolved in a very dilute solution of sulphuric acid, or a small quantity of this acid may be added to a solution of the chloride, in case a more copious evolution of chlorine is desired than that which takes place from the mere action of the atmosphere. Another way of effecting the same object, which is commended by Berzelius, is to mix the chloride with the bisulphate of potassa in powder, in which case it is only necessary to moisten the mixture to disengage the chlorine. The bisulphate, being a supersalt, here acts the part of an acid.

Chloride of lime may be advantageously applied to the purpose of purifying offensive water, a property which makes it invaluable on long voyages. When used for this purpose, from one to two ounces of the chloride may be mixed with about sixty-five gallons of the water. After the purification is effected, the water must be exposed for some time to the air and allowed to settle before it is fit to drink. For further details the reader is referred to an interesting article, by Mr. Elias Durand, on the chlorides of oxides, contained in the first vol. of the Journ. of the Phil. Col. of Pharm.

CHLORIDE OF POTASSA. *Javelle's Water. Eau de Javelle. Liquor Potassæ Chloridi.* This is obtained precisely as the chloride of soda, described in the next article. It is employed for taking out fruit stains, &c., from linen. In chemical constitution, it is deemed a *chlorite.*

CHLORIDE OF SODA. *Labarraque's Disinfecting Soda Liquid. Liquor Sodæ Chloridi.* This compound was first brought into notice as a disinfecting agent by Labarraque, an apothecary of Paris, who announced it to be a combination of chlorine with soda, analogous to the chloride of lime. Its nature has since been investigated by Phillips and Faraday, especially by the latter, who considers it not to be exclusively a chloride of soda; but a combination of this chloride, which is its active ingredient, with a certain portion of carbonate of soda.

Preparation. In preparing the chloride of soda, it is necessary, in order to have a good preparation, to follow the proportions recommended by Labarraque. He dissolves 15 parts of carbonate of soda in 40 parts of water, and passes through the solution all the chlorine generated by a mixture of 2 parts of peroxide of manganese, and 6 parts of muriatic acid of commerce. The chlorine should be passed through water to free it from muriatic acid. During the continuance of the process no carbonic acid is evolved.

Another process for obtaining the chloride of soda, more easy of execution than the above, is that proposed by M. Payen. It consists in decomposing the chloride of lime by carbonate of soda. By double decomposition, chloride of soda and carbonate of lime are formed, the latter of which separates in consequence of its insolubility. The proportions directed by M. Payen are, a pound of dry chloride of lime, two pounds of crystallized carbonate of soda, and eighteen pounds of water. The chloride is dissolved in twelve pounds of water, which is added by small successive portions, and the solution obtained allowed to settle for three hours in a covered vessel; after which it is decanted clear, and filtered. The insoluble portion is now thrown upon a filter, and exhausted by two successive additions of water of two pounds each. The carbonate of soda is now dissolved, by the assistance of heat, in two pounds of water, and the solution having been allowed to grow cold, is mixed with that of the chloride of lime. An abundant precipitate of carbonate of lime is immediately formed, from which the solution of chloride of soda, simultaneously generated, is decanted. This is then filtered and introduced into bottles, which should be carefully stopped. The quantities of the materials above indicated, yield about two gallons and a half of the liquid chloride of soda.

Properties. Labarraque's soda liquid has a pale yellow colour, and a slight odour of chlorine. Its taste is sharp, saline, and but feebly alkaline, producing a persisting biting impression on the tongue. It possesses an alkaline reaction. When boiled, chlorine is not given off, nor is its bleaching property sensibly impaired; and if carefully evaporated, a mass of damp crystals will be obtained, which, when redissolved in water, will possess the properties of the original liquid. When long kept it undergoes alteration, from the generation of chloric acid and chloride of sodium.

Composition. The nature of Labarraque's liquid is still involved in doubt. It seems to be conceded, however, that it is not a pure chloride of soda, as it contains carbonic acid as well as the constituents of that combination. Berzelius takes the same view of it as he does of the chloride of lime; namely, that it is a compound of chlorous acid (tritoxide of chlorine) and soda. He accordingly calls it *chlorite of soda.* (See *Chloride of Lime.*) Dr. Turner has thrown out the conjecture that the chlorine, in this preparation, combines with half the soda; while the other half, with all the carbonic acid, constitutes a bicarbonate. On this view of its composition, Labarraque's liquid is a combination of chloride and bicarbonate of soda.

Medical Properties and Uses. Chloride of soda is a powerful disinfectant, possessing in this respect the same general properties as the chloride of lime. It is, however, much better suited for disinfecting operations; as it does not, when exposed to air, become covered with a crust of carbonate of lime, an objection to which the solution of the bleaching powder is liable. It was first introduced to the notice of the French practitioners by Labarraque; and the experience already had of its powers in various affections, has been sufficient to establish its remedial value. Its principal medical use is as an external application, though occasionally it is given internally. The external affections in which it has been found useful are, generally, all those attended with fetor; such as gangrenous and ill-conditioned ulcers, ulcerations of the gums, carbuncle, cancer, ozæna, mortification, putrid sorethroat, &c. It is applied, in such cases, in a more or less dilute state, as a wash, mixed with poultices, or imbibed by lint. In the sore mouth from ptyalism, it forms a good mouth-wash, when diluted with eight parts or more of water. In fetid discharges from the uterus and bladder, it has been employed with advantage as an injection, diluted with from fifteen to thirty parts of water for the uterus, and with sixty parts when the object is to wash out the bladder by means of a double cannula. The chloride has also been applied successfully to burns, and to cutaneous eruptions, particularly tinea capitis, and obstinate herpetic affections. Internally it has been exhibited in scarlatina maligna, in dysentery attended with peculiarly fetid stools, in those forms of dyspepsia attended with putrid eructations, and in asphyxia produced by sulphuretted hydrogen. The dose is from fifteen to twenty-five drops in a cupful of water, repeated every two or three hours.

As a disinfecting agent, chloride of soda is more valuable than the chloride of lime; but its comparative expensiveness will restrict its use to disinfecting operations on a small scale. In the bed chambers of the sick, especially with infectious diseases, it will be found highly useful, sprinkled on the floor or bed, and added to the vessels intended to receive the excretions. In short, it is applicable to most of the disinfecting purposes detailed under the head of ***chloride of lime***, to which article the reader is referred.

CHLORINE ETHERS. There appear to be three species of chlorine ether, each consisting of some form of hydro-carbon, united with different proportions of chlorine. The first is called *protochlorine ether*, and is formed by passing an excess of chlorine through cold alcohol. It consists of one equiv. of chlorine 35.42, and one of etherine 28.48. The second, denominated *bichlorine ether*, consists of two equiv. of chlorine and one of etherine, and is the long known oily liquid of the Dutch chemists, obtained by the action of olefiant gas on chlorine. The third species was discovered within a few years by three chemists, independently of each other—Soubeiran in France, Liebig in Germany, and Guthrie in this country. Dumas has determined its composition to be three equiv. of chlorine to one of bicarburet of hydrogen, and ascertained that it differs from formic acid, into which it is susceptible of conversion by the action of potassa, in containing an equivalent quantity of chlorine, in place of the oxygen of that acid. On account of its connection with formic acid, it is called by the French chemists chloroforme, which may be rendered in English chloroformid. It is this latter compound which it is the object more particularly of this article to describe.

Chloroformid was obtained by Mr. Guthrie by distilling a gallon from a mixture of three pounds of chloride of lime and two gallons of alcohol of sp. gr. 0.844, and rectifying the product by redistillations, first from a great excess of chloride of lime, and afterwards from strong sulphuric acid. Thenard recommends it to be obtained by dissolving one part of chloride of lime in three parts of water, decanting the solution, adding from one-fifth to one-tenth of alcohol, and distilling from a retort sufficiently capacious to guard against the overflowing of the materials when they swell. In the receiver water will condense, swimming over an oleaginous liquid. The water is decanted, and the oily liquid, being agitated several times with concentrated sulphuric acid, and rectified from finely powdered baryta, will furnish pure chloroformid.

This compound is a colourless oleaginous liquid, of a sweetish ethereal odour, and hot, aromatic, peculiar taste. It boils at 142° and has the sp. gr. of 1.480. It is not inflammable, but renders the flame of an alcohol lamp yellow and fuliginous. It is scarcely acted on by sulphuric acid in the cold, but dissolves readily in alcohol and ether, from its solution in which it is precipitated by water. The alcoholic solution, the state in which it is used in medicine, forms, when sufficiently diluted with water, an aromatic and saccharine liquid of a very grateful taste.

Medical Properties. Mr. Guthrie was led to prepare this ether by his peculiar process from noting a passage in Professor Silliman's Elements of Chemistry, which referred to the chloric ether of the Dutch chemists as being a grateful diffusible stimulant, when properly diluted. He supposed that he had fallen upon a cheap and easy process for obtaining this long known ether, without being aware that in reality he had obtained a new compound of the same class. Specimens of it were transmitted to Professor Silliman, who distributed portions among his medical friends. It appears to act as a diffusible soothing stimulus, in the same manner as sulphuric ether, but with this decided advantage, that, when sufficiently diluted, it possesses a bland, sweet taste, which renders its administration easy, even to children. It has been used with advantage in asthma, spasmodic cough, the sorethroat of scarlet fever, atonic quinsey, and other diseases in which a grateful and composing stimulus is indicated. Professor Ives, and Dr. N. B. Ives, of New Haven, speak favorably of its effects. The dose for an adult is a teaspoonful, diluted with water. In affections characterised by difficult respiration, it may be used by inhalation. It is employed for medicinal purposes in alcoholic solution.

CHROME YELLOW. This is the neutral chromate of lead, prepared by precipitating a solution of the nitrate of lead with chromate of potassa. It is of a beautiful lemon-yellow colour. The subchromate of lead, consisting of one equiv. of acid and two equiv. of base, is of a red colour, and is sometimes used as a pigment. *Chrome green* is a mixture of chrome yellow and Prussian blue.

CICHORIUM INTYBUS. *Succory.* A perennial herbaceous plant, indigenous in Europe, but naturalized in this country, where it grows in fields, and in roads along the fences, in neighbourhoods which have been long settled. It is one or two feet high, with large, compound, beautifully blue flowers, which appear in July and August, and serve to distinguish the plant at first sight. The whole plant has a bitter taste, without acrimony, or any very peculiar flavour. The taste is strongest in the root, and weakest in the flowers. The leaves, when young and tender, are said to be sometimes eaten as salad in Europe. Succory is gently tonic without being irritating, and is considered by some authors as aperient and deobstruent. It is said to be useful, if freely taken, in hepatic congestion, jaundice, and other visceral obstructions in the early stages; and it is affirmed to have done good even in pulmonary consumption. The usual form of administration is that of the decoction, which is prepared by boiling one or two ounces of the root, or a handful of the herb, in a pint of water. The root dried and roasted has acquired some popularity, in certain parts of Europe, as a substitute for coffee. The common *garden endive* is a species of Cichorium denominated *C. Endivia.*

CICUTA VIROSA. *Water hemlock. Cowbane.* A perennial, umbelliferous European plant, growing on the borders of pools and streams. It is exceedingly poisonous, proving fatal to most animals which feed upon it, though said to be eaten with impunity by goats and sheep. Several instances are on record of children who have died from eating the root by mistake for parsnip. It operates as an acrid narcotic, producing inflammation of the stomach, together with symptoms which indicate cerebral disturbance, such as vertigo, intoxication, and convulsions. When it vomits, as it frequently does, fatal effects are less apt to ensue. There is reason to believe that the narcotic principle is volatile, and that the plant is less poisonous in the dried than the recent state. It is at present never used internally as a medicine, having been superseded by the *Conium maculatum*, which is considered safer. Externally it is sometimes applied as an anodyne poultice in local pains, particularly those of a rheumatic or gouty nature.

The *Cicuta maculata* or *American water hemlock* is closely analogous, in botanical character, and in its operation upon the system, to the European species. In several instances, children have been fatally poisoned by eating its root. It is never used in medicine. For a full account of this plant, the reader is referred to Bigelow's Medical Botany, vol. i. page 125. In cases of poisoning by either of these plants, vomiting should be induced as speedily as possible, and maintained till the stomach is thoroughly evacuated.

CIVET. *Zibethum.* This is an odorous substance, obtained from two animals of the genus Viverra, viz., the *V. Civetta* or civet-cat of Africa, and the *V. Zibetha* which inhabits the East Indies. It is secreted into a cavity which opens between the anus and external genitals, and is collected from animals confined for the purpose. It is semi-liquid, unctuous, yellowish, becoming brown and thicker by exposure to the air, of a very strong, peculiar odour, similar to that of musk, though less agreeable and less diffusible, and of a bitterish, subacrid, disagreeable, fatty taste. When heated it becomes quite fluid, and at a higher temperature takes fire, and burns with a clear flame, leaving little residue. It is insoluble in water, and only slightly soluble in ether and cold alcohol; but heated alcohol dissolves it almost entirely, depositing it again upon cooling. It contains, among other ingredients, a volatile oil, fat, and free ammonia. In medicine it was formerly employed as a stimulant and antispasmodic, like castor and musk; but it is now used exclusively as a perfume.

CLEMATIS ERECTA. *Upright Virgin's Bower.* A perennial plant, growing wild on the continent of Europe. The leaves and flowers have an acrid burning taste, and if long retained in the mouth produce blisters. When bruised in a mortar they irritate the eyes and throat, giving rise to a flow of tears and to coughing; and applied to the skin they produce inflammation and vesication Hence the name of *flammula Jovis*, by which the plant was known in older pharmacy. The acrimony is greatly diminished by drying. Störck found this species of Clematis very useful in secondary syphilis, cancerous and other foul ulcers, and in severe headachs. He gave it internally, and at the same time applied the powdered leaves to the surface of the sore. It acted as a diuretic and diaphoretic. Two or three drachms of the leaves were infused in a pint of water, of which he administered four ounces three times a day. He also employed an extract, in the dose of a grain or two in the course of a day; but this preparation must have been nearly inert. At present the plant is not used.

Other species of Clematis have the same acrid properties. Among these are the *C. Flammula* or *sweet-scented virgin's bower*, which, though a native of Europe, is cultivated in our gardens, the *C. Vitalba* or *traveller's joy*, also a native of Europe, and several indigenous species, of which the *C. Virginica* or *common virgin's bower*, the *C. Viorna* or *leather flower*, and the *C. crispa*, have been particularly cited by authors as proper substitutes for the C. erecta used by Störck. All these are climbing plants. The C. Vitalba has been used in Europe with success in the cure of the itch. For this purpose the roots and stems, bruised, and boiled for a short time to diminish their acrimony, were infused in boiling oil, which, thus impregnated, was applied to the skin several times a day. Twelve or fifteen applications were usually sufficient to effect a cure.

COBALT BLUE. This beautiful pigment is a compound of oxide of cobalt and alumina, obtained by precipitating the mixed solutions of a salt of alum and of cobalt by means of an alkali, and washing, drying, and strongly calcining the precipitate. (*Berzelius.*) The cobalt blue of Thenard is made by heating together the hydrated subphosphate of cobalt and hydrate of alumina. It is used in painting.

COBWEB. *Spider's Web. Tela Araneæ.* The genus *Aranea* of Linn. has been divided by subsequent naturalists into several genera, of which the *Tegeneria* of Walkenaer is the one that includes the medicinal species of spider. The *T. domestica* of Europe, and *T. medicinalis* of this country, (Henz, *Journ. Acad. of Nat. Scien.* ii. 53,) are the particular species which have attracted most attention. They inhabit cellars, barns, and other dark places, and are of a brown or blackish colour. It is affirmed that the web of the field spider is inefficacious, while that collected in the cellars of houses, &c., has extraordinary medical virtues. Several authors speak in very decided terms of its powers as a febrifuge and antispasmodic. According to Dr. Robert Jackson, it is superior even to bark and arsenic in the cure of intermittents, and is, moreover, highly useful in various spasmodic and nervous diseases, controlling and tranquillizing irregular nervous action, exhilarating the spirits, and disposing to sleep, without producing any of the narcotic effects of opium on the brain. These praises are to a certain extent echoed by Dr. Chapman and Dr. Eberle, in their respective works on Therapeutics and Materia Medica. Among the complaints in which it has been found useful, besides intermittent fever, are periodical headach, the hectic fever of consumption, asthma, hysteria, and nervous irritations attended with morbid vigilance and irregular muscular action. It will be observed, that these are, for the most part, affections over which the imagination has much control. The dose of spider's web is five or six grains, to be given in the form of pill, and repeated every three or four hours. Dr. Jackson states that its influence is not in proportion to the quantity administered, and that he obtained the same effects from ten as from twenty grains. This might well be, if the supposition be allowed, that its chief operation is through the mind of the patient. Spider's web has also been used externally, with asserted advantage, as a styptic in wounds, and a healing application in superficial ulcers. Spiders themselves were formerly employed in the treatment of intermittent fever, and the application of the web to the cure of this disease is not a measure of recent origin.

COCOA. *Cacao. Chocolate Nuts.* These are the seeds of the *Theobroma Cacao*, a handsome tree, from twelve to twenty feet in height, growing in Mexico, the West Indies, and South America, in some parts of which it is largely cultivated, particularly in Guayaquil and Venezuela. The fruit is an oblong ovate capsule or berry, six or eight inches in length, with a thick, coriaceous, somewhat ligneous rind, enclosing a whitish pulp, in which numerous seeds are embedded. These are ovate, somewhat compressed, about as large as an almond, and consist of an exterior thin shell, and a brown oily kernel. Separated from the matter in which they are enveloped, they constitute the *cocoa* of commerce. They have a slightly aromatic, bitterish, oily taste, and, when bruised or heated, an agreeable odour. They contain a large quantity of fixed oil, together with albumen and bitter extractive. The oil is obtained by hot expression, or by decoction. It is a soft solid, whitish or yellowish, with a peculiar agreeable odour and a bland pleasant taste, and is known by the name of *cocoa butter.* It is said to be frequently adulterated with animal fats. The chief use to which it is applied, is as an ingredient in cosmetic unguents. The shells of the nuts are sometimes employed in the state of infusion, as a substitute for tea or coffee. They impart to boiling water a taste analogous to that of chocolate, but weaker. The kernel is consumed in great quantities, in the shape of chocolate, or in some analogous form.

Chocolate is differently prepared in different countries. In Great Britain and the United States, it usually consists, when pure, exclusively of the cocoa nuts, which are first roasted, then deprived of their shell, and lastly reduced, by grinding between heated stones, to the state of a paste, which is moulded into oblong cakes. Not unfrequently rice flour or other farinaceous substance, with butter or lard, is added; but these must be considered as adulterations. On the continent of Europe, sugar is generally incorporated with the paste, and spices, especially cinnamon, are often added. Vanilla is a favorite addition in South America, France, and Spain. Cocoa is often sold in the state of powder, which is sometimes mingled with other ingredients, such as ground rice, barley flour, sugar, &c. Chocolate is prepared for use by reducing it to powder, and boiling it in milk, water, or a mixture of these fluids. In this state it is much employed as a drink at the morning and evening meals, and serves as an excellent substitute for coffee in dyspeptic cases, being nutritive and digestible, without exercising any narcotic or otherwise injurious influence. It is also a good article of diet for convalescents, and may sometimes be given advantageously as a mild nutritive drink in cases of disease, though, under these circumstances, it should usually be prepared without milk, and of less strength than as ordinarily used.

CODFISH OIL. *Oleum Jecoris Aselli. Huile de Morue, Fr.* A fixed oil obtained from the liver of the codfish, the *Gadus Morrhua* of naturalists. It is procured by exposing the livers, heaped up in tubs, to the sun's rays. The oil flows out spontaneously, and is collected in proper vessels. That first received is limpid and of a light yellowish colour, and is reserved for internal use. After the commencement of putrefaction in the livers, a darker coloured oil flows out, which is unfit for medical purposes. A still darker and more offensive liquid is obtained by boiling the livers in iron pots.

Codfish oil has been much lauded, on the continent of Europe, particularly in Germany and Switzerland, as a remedy in gouty and rheumatic affections, scrofula and rickets, obstinate constipation, incontinence of urine, and intestinal worms. The dose is a tablespoonful three or four times a day for adults, a teaspoonful repeated as frequently for children. It may be taken alone, or mixed with some mucilaginous liquid. It is sometimes also applied externally by friction, and, in cases of ascarides or lumbricoides, is injected into the rectum.

COFFEE. The coffee plant—*Coffea Arabica*—belongs tot he class and order Pentandria Monogynia of the sexual system, and to the natural order Cinchonaceæ of Lindley. It is a small tree, rising from fifteen to twenty feet in height, and in favourable situations sometimes even thirty feet. The branches are opposite,the lower spreading, the upper somewhat declining, and gradually diminishing in length as they ascend, so as to form a pyramidal summit, which is covered with green foliage throughout the year. The leaves are opposite, upon short footstalks, oblong-ovate, acuminate, entire, wavy, four or five inches long, smooth and shining, of a dark green colour on their upper surface, paler beneath, and accompanied with a pair of small, pointed stipules. The flowers are white, with an odour not unlike that of the jasmine, and stand in groups in the axils of the upper leaves. The calyx is very small, the corolla salverform, with a nearly cylindrical tube, and a flat border divided into five lanceolate, pointed segments. The stamens project above the tube. The fruit, which is inferior, is a roundish berry, umbilicate at top, at first green, then red, and ultimately of a dark purple colour. It is about as large as a cherry, and contains two seeds, surrounded by a paper-like membrane, and enclosed in a yellowish pulpy matter. These seeds, divested of their coverings, constitute coffee.

The tree is a native of Southern Arabia and Abyssinia, and probably pervades Africa about the same parallel of latitude, as it is found growing wild at Liberia on the western coast of the continent. The value of its produce has led to its extensive cultivation in various parts of the world where the temperature is sufficiently elevated and uniform. Considerable attention has long been paid to its culture in its native country, particularly in Yemen, in the vicinity of Mocha, from which the demands of commerce were at first almost exclusively supplied. About the year 1690, it was introduced by the Dutch into Java, and in 1718 into their colony of Surinam. Soon after this latter period, the French succeeded in introducing it into their West India islands, Cayenne, and the Isles of France and Bourbon; and it has subsequently made its way into the other West India islands, various parts of tropical America, the peninsula of Hindostan, and Ceylon.

The tree is raised from the seeds, which are sown in a soil properly prepared, and germinating in less than a month, produce plants which at the end of the year are large enough to be transplanted. These are then set out in rows at suitable distances, and in three or four years begin to bear fruit. It is customary to top the trees at this age, in order to prevent their attaining an inconvenient height, and to increase the number of fruit-bearing branches. It is said that they continue productive for thirty or forty years. Though almost always covered with flowers and fruit, they yield most abundantly at two seasons, and thus afford two harvests during the year. Various methods are employed for freeing the seeds from their external coverings; but that considered the best, is by means of machinery to remove the fleshy portion of the fruit, leaving the seeds surrounded only by their papyraceous envelope, from which they are afterwards separated by drying and by the action of peeling and winnowing mills.

The character of coffee varies considerably with the climate and mode of culture. Consequently several varieties exist in commerce, named usually from the sources from which they are derived. The *Mocha coffee*, which is in small and roundish grains, takes the precedence of all others; but very little of it is now imported into Europe or America. The *Java coffee* is generally esteemed most highly in this country, and commands the highest price; but our chief supplies are derived from the West Indies and South America. Some good coffee, we are told, has recently been brought from Liberia. Coffee is thought to improve by age, losing a portion of its strength, and thus acquiring a more agreeable flavour. It is said to be much better when allowed to become perfectly ripe upon the tree, than as ordinarily collected. The grains should be hard, and so heavy as readily to sink in water. When soft, light, black or dark coloured, or musty, they are inferior.

The general aspect of coffee is too well known to need description. It has a faint peculiar odour, and a slightly sweetish, somewhat austere taste, entirely different from that developed by roasting. From the experiments of Seguin, Schrader, Robiquet and Pelletier, and other chemists, it appears to contain a minute quantity of volatile oil, a concrete fixed oil, gum, resin, an extractive matter having the characteristic taste of the coffee and affording a dark green precipitate with the salts of iron, albumen, a little sugar, saline substances, lignin, and a peculiar crystallizable principle which has received the name of *caffein*. This was first discovered by Runge, and afterwards by Robiquet. It may be obtained in the following manner. Exhaust bruised coffee by two successive portions of boiling water, unite the infusions, add acetate of lead in order to precipitate the principles which accompany the caffein, filter, decompose the excess of acetate of lead in the filtered liquor by sulphuretted hydrogen, and evaporate to the point of crystallization. The crystals which form may be purified by again dissolving them in water and evaporating. This is the process employed by Runge. (*Berzelius, Trait. de Chim.*) Pelletier obtained caffein by submitting the alcoholic extract of coffee to the action of water, treating the solution thus obtained with magnesia, filtering, evaporating the filtered liquor to the consistence of syrup, treating the residue with alcohol, and filtering and evaporating the alcoholic solution. (*Dict. des Drogues.*) Caffein crystallizes by the cooling of its concentrated solution, in opaque, silky, flexible needles; by slow and spontaneous evaporation, in long, transparent prisms. It has a feebly bitter and disagreeable taste, is soluble in water and alcohol, but insoluble in ether and oil of turpentine, combines neither with alkalies nor acids, melts when exposed to heat, and at a higher temperature sublimes, without residue, into needles analogous to those formed by benzoic acid. It is remarkable for containing a larger proportion of nitrogen than any other proximate vegetable principle, and in this respect equals some of the most highly animalized products. According to Pelletier and Caventou, its constituents are in 100 parts, 46.51 parts of carbon, 4.81 of hydrogen, 21.54 *of nitrogen*, and 27.14 of oxygen. Fibrin contains only about 20 per cent. of nitrogen. Notwithstanding the quantity of nitrogen in its composition, caffein does not putrefy, even when its solution is kept for some time in a warm place. Quite recently Pfaff has ascertained, what had been previously to a certain extent observed by Runge, that in the precipitate produced by acetate of lead with the decoction of coffee, there are two peculiar principles, one resembling tannin, the other having acid properties, and called *caffeic acid*. The latter may be obtained by decomposing with sulphuretted hydrogen the precipitate previously suspended in water, filtering the liquor, evaporating it to the consistence of syrup, and then adding alcohol, which precipitates the acid, mixed with several caffeates, from which the acid may be separated by boiling water. The most interesting character of this acid is that, when decomposed by heat, it exhales the odour of burnt coffee, and is therefore probably, in part at least, the source of those empyreumatic products, to the delicious flavour of which coffee owes its chief value.

Coffee undergoes considerable change during the roasting process. It swells up very much, acquiring almost double its original volume, while it loses about 20 per cent. of its weight. It acquires, at the same time, a peculiar odour entirely different from that of the unaltered grains, and a decidedly bitter taste. A volatile oil is developed during the process, and, according to Chenevix, a portion of tannin. The *caffein* does not appear to undergo material change, as, according to Garot, it may be extracted unaltered from the roasted coffee. The excellence of the flavour of roasted coffee depends much upon the manner in which the process is conducted, and the extent to which it is carried. It should be performed in a covered vessel, over a moderate fire, and the grains should be kept in constant motion. When these have acquired a chestnut-brown colour, the process should cease. If too long continued, it renders the coffee unpleasantly bitter and acrid, or by reducing it to charcoal, deprives it entirely of flavour. The coffee should not be burnt long before it is used, and should never be kept in the ground state, as it loses much of its agreeable flavour and activity.

Medical and Economical Uses. More attention has been paid to the effects of coffee on the system in the roasted than in the crude state. Unroasted coffee has been employed by Dr. Grindel of Russia in intermittent fevers, and the practice has been followed by some other physicians; but the success, though considerable, was not such as to lead to the conclusion that this medicine would answer as a substitute for Peruvian bark. It was given in powder in the dose of a scruple every hour, or in decoction prepared by boiling an ounce with eighteen ounces of water down to six, or in the state of extract in the dose of from four to eight grains. Whether its operation corresponds with that of the roasted coffee we are unable to say. The following observations relate only to the latter.

The action of coffee is directed chiefly to the nervous system. When swallowed it produces a warming cordial impression on the stomach, quickly followed by a diffused agreeable nervous excitement, which extends itself to the cerebral functions, giving rise to increased vigour of imagination and intellect, without any subsequent confusion or stupor such as characterizes the action of narcotic medicines. Indeed one of its most extraordinary effects is a disposition to wakefulness, which continues for several hours after it has been taken. It is even capable of resisting, to a certain extent, the intoxicating and soporific influence of alcohol and opium, and may sometimes be advantageously employed for this purpose. It also moderately excites the circulatory system, and stimulates the digestive function. A cup of coffee taken after a hearty meal, will often relieve the sense of oppression so apt to be experienced, and enable the stomach to perform its office with comparative facility. These exhilarating effects of coffee, united with its delicious flavour when suitably qualified by cream and sugar, have given rise to its habitual employment as an article of diet. Its use for this purpose has prevailed from time immemorial in Persia and Arabia. In 1517 it was introduced by the Turks into Constantinople, whence it was carried to France and England about the middle of the succeeding century, and has since gradually made its way into almost universal use. It cannot be supposed that a substance capable of acting so energetically upon the system, should be entirely destitute of deleterious properties. Accordingly, if taken in very large quantities, it leaves, after its first effects are passed, a degree of nervous derangement or depression equivalent to the previous excitement; and its habitual immoderate employment is well known very greatly to injure the tone of the stomach, and frequently to give rise to troublesome dyspeptic affections. This result is peculiarly apt to take place in individuals of naturally susceptible nervous systems, and in those of sedentary habits.

In the treatment of disease, coffee has been less employed than might have been expected from its effects upon the system. There can be no doubt that it may be advantageously used in various nervous affections. In a tendency to stupor or lethargy dependent on deficient energy of the brain, without congestion or inflammation, it would be found useful by stimulating the cerebral functions. In light nervous headachs, and even in sick headach not caused by the presence of offending matter in the stomach, it often proves useful. It has acquired much reputation as a palliative in the paroxysm of spasmodic asthma, and is recommended by some writers in hysterical affections. The Egyptians are said to have formerly employed it as a remedy in amenorrhœa. Hayne informs us that in a case of violent spasmodic disease, attended with short breath, palpitation of the heart, and a pulse so much increased in frequency that it could scarcely be counted, immediate relief was obtained from a cup of coffee, after the most powerful antispasmodics had been used in vain for several hours. It is said also to have been used very effectually in obstinate chronic diarrhœa; and Dr. Chapman of Philadelphia has found it highly useful in calculous nephritis. In all inflammatory affections of a high grade it is contraindicated.

Coffee is usually prepared in this country by boiling the roasted grains, previously ground into a coarse powder, in water for a short time, and then clarifying by the white of an egg. Some prefer the infusion, which has more of the aroma of the coffee, with less of its bitterness. The proper proportion for forming the infusion for medical use, is an ounce to a pint of boiling water, of which a cupful may be given warm for a dose, and repeated if necessary.

COLLINSONIA CANADENSIS. *Horse-weed. Horse-balm. Richweed. Heal-all. Stone-root. Knot-root.* An indigenous plant, with a perennial, knotty root, and an herbaceous simple stem about two feet high, furnished with two or three pairs of broad, cordate ovate, smooth leaves, and terminating in a panicle of yellow flowers in branched racemes. The flowers are diandrous and monogynous, with a labiate calyx and corolla, the latter of which has the lower lip fringed. The plant grows in woods from Canada to Carolina, and flowers from July to September. The whole plant has a strong disagreeable odour, and a warm pungent taste. It is considered tonic, astringent, diaphoretic, and diuretic; and the root in substance is said to irritate the stomach and produce vomiting even in small doses. The plant is used in numerous complaints in domestic practice. It is preferred in the fresh state, as the active principle is volatile. A decoction of the fresh root is said to have been used with advantage in catarrh of the bladder, leucorrhœa, gravel, dropsy, and other complaints; and the leaves are applied by the country people, in the form of cataplasm or fomentation, to wounds, bruises, and sores, and in cases of internal abdominal pains.

COLUTEA ARBORESCENS. *Bladder Senna.* A shrub, growing spontaneously in the southern and eastern parts of Europe, and cultivated in gardens as an ornamental plant. Its leaves are pinnate, consisting of from three to five pairs of leaflets, with an odd one at the end. The leaflets are obovate, slightly emarginate, smooth and of a deep green colour on the upper surface, grayish-green and somewhat pubescent beneath. The flowers are yellow, and the fruit vesicular, whence the plant derived its vulgar name. The leaflets are possessed of purgative properties, and, in some parts of Europe, are used as a substitute for senna, which is said to be sometimes adulterated with them. The bladder senna is comparatively very feeble. It is administered in infusion or decoction, of which the dose is about half a pint, containing the virtues of from one to three ounces of the leaves.

COMPTONIA ASPLENIFOLIA, *Sweet Fern.* A shrubby indigenous plant, named from the resemblance of its leaves to the *spleenwort fern*, but belonging to the Linnæan class and order *Monœcia Triandra.* It grows in thin sandy or stony woods, from New England to Virginia. All parts of it possess a resinous spicy odour, which is increased when the plant is rubbed. It is said to be tonic and astringent, and to be occasionally used in domestic practice as a remedy in diarrhœa, and various other complaints. It is employed in the form of decoction.

CONVALLARIA MAJALIS. *Lily of the Valley.* This charming little garden flower is a native of Europe, and is found growing wild in the United States, upon the highest mountains of Virginia and Carolina. The *flowers* have a strong delightful odour, which is in great measure lost by drying. Their taste is nauseous, bitter, and acrid. Taken internally they are said to be emetic and cathartic, and their extract purges actively in the dose of half a drachm. They were formerly used in epilepsy and against worms. At present they are employed only as a sternutatory, for which purpose they are dried and reduced to a coarse powder. The *root*, which is also bitter, has similar purgative properties, and, reduced to powder, is said to be sternutatory.

CONVALLARIA POLYGONATUM, Linn. *Polygonatum uniflorum*, Desfontaines. *Solomon's seal.* A perennial, herbaceous European plant, the root of which is horizontal, jointed, white, and marked, at short intervals, with small circular impressions, which bear a remote resemblance to those made by a seal, and have served to give a name to the plant. The root is inodorous, and of a sweetish mucilaginous taste, followed by a slight degree of bitterness and acrimony. It is said to be emetic. In former times it was used externally in bruises, tumours, wounds, and cutaneous eruptions, and was highly esteemed as a cosmetic. At present it is not employed, though recommended by Hermann as a good remedy in gout and rheumatism. The berries and flowers are said to be acrid and poisonous.

The *C. multiflora* (*Polygonatum multiflorum*, Desf.), which grows in this country, as well as in Europe, is analogous to the preceding in properties.

COPAL. A resinous substance, brought from the East Indies, South America, and the western coast of Africa, but most abundantly from the first mentioned source. It is the concrete juice of different trees, and is furnished by exudation. The East India copal is said to be derived from the *Vateria Indica* of Linn., the *Elæocarpus copalliferus* of Retzius; and the Brazilian is attributed by Martius and Hayne, probably with justice, to different species of *Hymenæa.* Copal varies somewhat in appearance and properties, as procured from different sources. It is in roundish, irregular, or flattish pieces, colourless, yellowish, or brownish-yellow, more or less transparent, very hard, with a shining conchoidal fracture, inodorous and tasteless, of a sp. gr. varying fron 1.045 to 1.139, insoluble in alcohol, soluble in ether, and slightly so in oil of turpentine. Some varieties unite with alcohol if suspended in its vapour while boiling. By heat it melts and is partially decomposed, becoming thereby soluble in alcohol and oil of turpentine. It is not a proximate principle, but consists of various resins united in different proportions. The East India copal is in flatter pieces than the American or African, and is whiter, softer, and less transparent. Two kinds are known in the drug market—the *crude* and the *scraped*—the former of a dull opaque appearance externally, the latter much clearer and more transparent, in consequence of being deprived of its outer coat. The process of *scraping* is said to consist in the removal of the exterior portion by means of an alkaline solution, which readily dissolves copal. This resin is used chiefly in the preparation of varnishes.

CORAL. A substance found at the bottom of the Mediterranean and other Seas, supposed originally to belong to the precious stones, afterwards considered as a plant, but now universally admitted to belong to the animal kingdom. The *red coral* (*Corallium rubrum* of Lamarck, *Isis nobilis* of Linn.) is in the form of a small shrub, a foot or two in height, with a stem sometimes an inch in thickness, fixed to the rock by an expansion of the base, divided above into branches, and covered with a pulpy membrane, which is properly the living part, and which is removed when the coral is collected. The central portion is extremely hard, of various shades of red, susceptible of a brilliant polish, longitudinally striated, and formed of concentric layers, which are rendered obvious by calcination. Its chief constituent is carbonate of lime, which is coloured by oxide of iron, and united, as in similar calcareous products, with more or less animal matter. It was formerly very highly valued as a remedy in numerous diseases, but is in no respect superior to prepared oyster shells, or other form of carbonate of lime derived from the animal kingdom. It was employed in the form of fine powder, or in different preparations, such as troches, syrups, conserves, tinctures, &c. At present it is valued chiefly as an ornament.

CORTEX CARYOPHYLLATA. *Cassiaa Cryophyllata. Clove Bark.* These names have been given to a bark, brought from the West Indies, and derived from a tree belonging to the family of the Myrtaceæ, supposed to be the *Myrtus acris* of Schwartz. It is usually in cylinders from one to two feet long by an inch in diameter, composed of numerous separate pieces rolled around one another, having a dark brown colour, a pungent taste, and an odour similar to that of cloves. It is sometimes in fragments, of a similar colour, taste, and smell, but softer and lighter, and supposed to be derived from older branches. A similar bark is said to be derived from the *Myrtus caryophyllata* of Linn., which grows in Ceylon. The clove bark has aromatic properties not unlike those of the spice from which it derived its name; but it is much inferior, and is now never used in this country. Some authors have confounded with it a wholly different bark produced by a tree growing in the Moluccas, and known by the Indian name of *culilawan.* (See *Culilawan.*)

CREOSOTE. *Creosotum.* This is the name of a substance, of the nature of the volatile oils, which was discovered in 1830 by Dr. Reichenbach of Moravia in the products of the distillation of wood. In the products of the distillation of organic substances generally, whether vegetable or animal, he also discovered five other substances, called paraffine, eupione, picamar, capnomor, and pittacal. *Paraffine* is a white, crystalline, soft solid, devoid of taste or smell, and characterized by its feeble affinity for other bodies, as is indicated by its name, from *parum affinis.* *Eupione* is an inodorous, insipid, limpid, and colourless liquid, of the sp. gr. 0.740, obtained most abundantly from animal tar, and Dippel's animal oil. Both these substances are composed exclusively of hydrogen and carbon. *Picamar* is an oily colourless liquid, heavier than water, of a peculiar odour and very bitter taste. It is present in the heaviest portion of the rectified oil of tar, and constitutes the bitter principle of that substance. *Capnomor*, so called from its being one of the ingredients of smoke, is a colourless liquid, lighter than water, having a pleasant odour and a pungent taste, and occurring in the heavy oil of tar. It has the property of dissolving caoutchouc, and is an ingredient in coal naphtha, which derives from its presence the property of dissolving the same substance. *Pittacal*, also obtained from the heavy oil of tar, is a solid of a beautiful blue colour, and differing from the other substances above noticed, in containing nitrogen as one of its elements. These five substances have no uses, but creosote has attracted a large share of attention since its discovery, on account of its alleged therapeutic powers.

Preparation. Creosote is obtained either from tar or from crude pyroligneous acid. When tar is used, it is distilled until it has attained the consistence of pitch. The distilled liquid divides itself into three layers, an aqueous between two oily layers. The inferior oily layer, which alone contains the creosote, is separated, and saturated with carbonate of potassa, to remove acetic acid. The liquid is allowed to rest, and the new oil which separates is decanted from it. This oil is distilled, and yields products lighter than water, and a liquid heavier. The latter alone is preserved, and, having been agitated repeatedly with weak phosphoric acid to neutralize ammonia, is allowed to remain at rest for some time. It is next washed as long as acidity is removed, and then distilled with a fresh portion of weak phosphoric acid, observing to cohobate from time to time. The oily liquid thus rectified is colourless, and contains much creosote, but also a portion of eupione. To separate these the liquid is mixed with a solution of caustic potassa of the density of 1.12, which dissolves the creosote, but not the eupione. Having separated the eupione which swims above from its levity, the alkaline solution of the creosote is exposed to the air, until it becomes brown as a consequence of the destruction of a foreign matter, and is then saturated with sulphuric acid. This sets free the creosote, which is decanted and again distilled. The treatment by solution of potassa, sulphuric acid, &c., is to be repeated until the creosote no longer becomes brown by exposure to the air, but only slightly reddish. It is then dissolved in a stronger solution of potassa and distilled again, and finally re-distilled for the last time, rejecting the first portions which come over on account of containing much water, collecting the next portions, and avoiding to push the distillation too far. The product collected in this distillation is pure creosote.

When creosote is extracted from pyroligneous acid, the first step is to dissolve sulphate of soda in it to saturation. The oil which separates and swims above is decanted, and, having been allowed to remain at rest for a few days, is saturated by carbonate of potassa with the assistance of heat, and distilled with water. The oleaginous liquid obtained is of a pale yellow colour, and is to be treated with phosphoric acid, &c. &c., as above detailed with respect to the treatment of the corresponding oil obtained from tar.

Properties. Creosote is a colourless oleaginous liquid, of the consistence of oil of almonds, slightly greasy to the touch, and having a caustic and burning taste, and a penetrating, disagreeable odour, which recalls that of smoked meat. Applied to the skin in a concentrated state it quickly destroys the cuticle. On paper it leaves a greasy stain, which disappears in a few hours, or very rapidly when exposed to a gentle heat. Its sp. gr. is 1.037. It boils at 397°, retains its fluidity at—17°, is a non-conductor of electricity, and refracts light powerfully. It is devoid of acid or alkaline reaction. Mixed with water, it forms two combinations—one a solution of 1 part of creosote in 400 of water, the other, of 1 part of water in 10 of creosote. It unites in all proportions with alcohol, ether, and naphtha. It is capable of dissolving a large quantity of iodine and phosphorus, and a considerable portion of sulphur, especially when assisted by heat.

Creosote forms two combinations with potassa, one anhydrous, of an oleaginous consistence, the other, hydrated, and in the form of small, white pearly scales. It possesses similar habitudes with soda. It instantly dissolves ammonia, and retains it with great force. It dissolves the oxide of copper also, but is converted into a resinous matter by the oxide of mercury, which in the mean time is reduced. Nitric and sulphuric acids, in a concentrated state, decompose creosote, the former giving rise to abundant reddish vapours, the latter to a red colour, which becomes black on the addition of more of the acid. Acetic acid unites with it in all proportions without decomposing it. Creosote dissolves a large number of metallic salts, and reduces a few to the metallic state; as for example, nitrate and acetate of silver. It possesses the power of coagulating albumen.

Of all the properties of creosote, the most important is its power of preserving meat. It is this property which has suggested its name, derived from *κρεὰς flesh*, and *σωζω I save.* Dr. Reichenbach states that fresh meat, dipped for a quarter of an hour in a solution of creosote, is preserved from putrefaction, and concludes that smoked meats owe their power to resist change to the presence of this substance.

Medical Properties, &c. Creosote in its pure state is a moderate escharotic; when in solution, a stimulant and antiseptic. It is used both internally and externally. Internally it has been employed in a number of diseases; externally, for the most part as an application to eruptions, wounds, and ulcers, and as an injection and gargle. The principal diseases in which it has been given are catarrh, hemoptysis, and pulmonary consumption. Over the latter disease it has no curative influence; but it is stated to facilitate expectoration and to give the sputa a more favourable character. The eruptions to the treatment of which it has been supposed to be best suited are itch, and the various kinds of tetters. In burns its efficacy has been fully established, especially in those attended with excessive suppuration and fungous granulations. In chilblaines also it is stated to be a useful application. When applied to wounds, it has a decided effect in stopping the capillary hemorrhage, but no power to arrest the bleeding from large vessels, as has been erroneously asserted. The ulcers, in the treatment of which it has been found most useful, are those of an indolent and gangrenous character, in which its several properties, escharotic, stimulant, and antiseptic, are usefully brought into play. It is also praised as an application to syphilitic, scrofulous, and cancerous ulcers. In all these cases, the remedy must be used of appropriate strength, and continued with judgment; and in case it should irritate, its use should be suspended, or alternated with that of emollient and soothing applications. In fistulous ulcers, it proves a useful resource, used by injection, by exciting the callous surfaces and disposing them to unite. In cases of putrid sorethroat, in which the use of a stimulant and antiseptic are required, a gargle of creosote acts beneficially; and in chronic suppuration of the external meatus of the ear, the same properties make it valuable as an injection. A drop or two inserted in the hollow of a carious tooth will destroy the exposed surface of the nerve, and in many instances temporarily cure the toothach.

Creosote is employed in a pure state, in mixture or solution, and in the form of ointment. In the pure state, it may be brushed over indolent or ill-conditioned ulcers, or applied by means of lint, to arouse their sensibility, or to create a new action. Internally it is given in mixture, in the dose of one or two drops, or more, repeated several times a day, in a fluidounce of the vehicle. When used as a lotion for eruptions, ulcers, or burns, or as a gargle or injection, it is employed in solution, containing two, four, or six drops to the fluidounce of distilled water, the strength being determined by the circumstances of each particular case. The ointment of creosote is made of various strengths according to the object in view. When used in frictions to tumors or indurations, six or eight drops may be mixed with an ounce of lard; and when applied as a dressing to ulcers or eruptions, a drachm may be rubbed up with the same quantity of lard. In some cases the solution of creosote is used externally, mixed with poultices.

No antidote is known to the poisonous effects of creosote; but its presence is easily detected after death by its peculiar and penetrating smell.

According to Ettling, creosote consists of 7.8 hydrogen, 76.2 carbon, and 16 oxygen, proportions which coincide most nearly with nine equiv. of hydrogen, fourteen of carbon, and two of oxygen.

CUCURBITA CITRULLUS. *Watermelon.* The seeds of the watermelon are employed to a considerable extent as a domestic remedy in strangury and other affections of the urinary passages. They have the same properties with the seeds of the other Cucurbitaceæ, of which four different kinds were formerly officinal under the name of the *greater cold seeds*—viz. those of the *Cucurbita Pepo* or pumpkin, the *Cucurbita Lagenaria* or gourd, the *Cucumis Melo* or muskmelon, and the *Cucumis sativus* or cucumber. These, when bruised and rubbed up with water, form an emulsion which was formerly thought to possess considerable virtues, and was much used in catarrhal affections, disorders of the bowels and urinary passages, fever, &c. Of late, however, they have been entirely neglected, having been superseded by other more agreeable demulcents. The watermelon seeds are esteemed by some diuretic, as well as demulcent. They are usually given in the form of infusion, made in the proportion of one or two ounces of the bruised seeds to a pint of water, and taken *ad libitum.*

CULILAWAN. *Cortex Culilaban.* An aromatic bark, produced by the *Laurus Culilaban*, a tree of considerable size, growing in the Molucca islands, Cochinchina, and other parts of the East. It is usually in flat or slightly rolled pieces, several inches long, an inch or more in breadth, and one or two lines thick. Sometimes the bark is thinner and more quilled, bearing considerable resemblance to cinnamon. The epidermis is for the most part removed, but when present is of a light brownish-gray colour, soft to the touch, and somewhat spongy. The colour of the bark itself is a dull dark cinnamon-brown, the odour highly fragrant, the taste agreeably aromatic, and not unlike that of cloves. The active constituent is a volatile oil which may be separated by distillation. Culilawan has the medical properties common to the aromatics, but is scarcely used at present.

CUNILA MARIANA. *American Dittany.* A small indigenous perennial herb, growing on dry, shady hills, from New England to Georgia, and flowering in June and July. The whole herb has a warm pungent taste, and a fragrant odour, dependent on an essential oil which may be obtained separate by distillation with water. The medical properties of the plant are those of a gently stimulant aromatic, analogous to the mints, pennyroyal, &c. In the shape of warm infusion, it is popularly employed to excite perspiration in colds and slight fevers, to promote suppressed menstruation, to relieve flatulent colic, and for various other purposes to which the aromatic herbs are thought applicable.

CUTTLE-FISH BONE. *Os Sepiæ.* This is a calcareous body, situated underneath the skin, in the back of the *Sepia officinalis*, or *cuttle-fish*, which inhabits the seas of Europe, especially in the Mediterranean, in the waters of which the bone is not unfrequently found floating. It is oblong-oval, from five to ten inches long, and from one and a half to three inches broad, somewhat convex on both sides, with thin edges, of a rather firm consistence upon the upper surface, very friable beneath, and composed of numerous layers, loosely connected, so as to give to the mass a porous consistence. It is lighter than water, of a white colour, a feeble odour of sea-plants, and a saline taste. It contains, according to John, from 80 to 85 per cent. of carbonate of lime, besides animal matter, a little common salt, and traces of magnesia. Reduced by levigation and elutriation to a fine powder, it may be given as an antacid under similar circumstances with chalk or oyster-shell. It is sometimes used as an ingredient of tooth-powders. Small pieces of it are often put into bird cages, that the birds may rub their bills against them; and the powder is employed for polishing.

Another product of the cuttle-fish is a blackish-brown liquor, secreted by a small gland into an oval pouch, communicating externally near the rectum by a long excretory duct, through which the animal is said to have the power of ejecting it at will. This, when taken from the fish, is dried, and used in the preparation of the water colour called *sepia.*

CYANURET OF POTASSIUM. This medicine, from its growing importance, deserves a more extended notice than that given to it under the head of hydrocyanic acid, in the note at page 713. It is obtained from the yellow salt, called ferrocyanate of potassa, which is in fact a double cyanuret of potassium and iron. The double salt is first dried, and then exposed, in a porcelain or stoneware retort, to a long continued red heat, until nitrogen ceases to be disengaged. During the cooling of the retort, its mouth is closed by luting, to prevent the access of air. By the calcination, the cyanuret of iron is decomposed and converted into quadricarburet of iron, while the cyanuret of potassium remains unchanged. The calcined product is a blackish lamellar mass, consisting of the cyanuret of potassium, rendered impure by the charcoal and iron derived from the decomposed cyanuret. It is purified by treating it with a small quantity of cold water, which dissolves the cyanuret of potassium, leaving the impurities behind. The solution is then evaporated to dryness under an exhausted receiver, by means of sulphuric acid, and the dry mass is the cyanuret in question.

Cyanuret of potassium is usually yellow, but perfectly white and transparent when very pure. Its taste is alkaline. In close vessels, it is indecomposable by heat; but it is readily decomposed by the action of water, especially at the boiling point, being converted into ammonia and formiate of potassa. Even moisture is sufficient to determine its decomposition in part. It is very soluble in water, but sparingly so in alcohol. All acids have the power of decomposing it, not excepting the carbonic. It is on this account that its solution constantly emits the smell of hydrocyanic acid by contact of air, and is converted into carbonate of potassa. It consists of one equiv. of cyanogen and one of potassium.

Medical Properties, &c. This cyanuret is pre-eminently poisonous, acting precisely like hydrocyanic acid. The tenth of a grain of the salt killed a small bird in the space of a minute. A solution of five grains destroyed a large dog in a quarter of an hour. As a medicine it is considered applicable to all cases in which hydrocyanic acid has been found useful. The grounds on which it has been proposed as a substitute for that acid are its uniformity as a chemical product, and its less liability to undergo decomposition. The dose is a quarter of a grain, gradually increased to a grain. The solution, *extemporaneously* made, is the most convenient form for exhibition; and a standard solution has been proposed by Magendie, under the name of medicinal hydrocyanate of potassa, prepared by dissolving the cyanuret in eight times its weight of distilled water. A solution of this strength is equivalent to the medicinal hydrocyanic acid, and may be prescribed in mixtures in the dose of two or three drops.

CYANURET OF ZINC. This cyanuret is precipitated as a white insoluble powder, by adding cautiously, until it ceases to produce a precipitate, a recent, filtered solution of cyanuret of potassium, obtained from the impure black cyanuret, to a solution of sulphate of zinc. It is used in Germany as a substitute for hydrocyanic acid, and is said to possess anthelmintic properties. It has been employed with alleged advantage in cramp of the stomach and in the colics attendant on difficult menstruation. The dose is a quarter of a grain, gradually increased to a grain and a half, given in mixture.

CYNANCHUM VINCETOXICUM. R. Brown. *Asclepias Vincetoxicum.* Linn. *White Swallow-wort. Vincetoxicum.* A perennial herbaceous European plant, the root of which was formerly esteemed a counterpoison, and hence gave origin to the officinal name. It has a bitterish acrid taste, and when fresh, a disagreeable odour which is diminished by drying. Taken internally, especially in the recent state, it excites vomiting, and is capable in large quantities of producing dangerous if not fatal inflammation of the stomach. Its former reputation as an alexipharmic was wholly without foundation. It is said to be useful in cutaneous diseases, scrofula, &c.; but is little employed. The leaves of the plant also are emetic. Feneulle found in the root a peculiar principle analogous to emetin.

CYNOGLOSSUM OFFICINALE. *Hound's Tongue.* A biennial plant, common both in Europe and this country, and named from the shape of its leaves. The leaves and root have been employed, but the latter has been generally preferred. The fresh plant has a disagreeable narcotic odour resembling that of mice, which is dissipated by drying. The taste is nauseous, bitterish, and mucilaginous. Different opinions as to its powers have been entertained, some considering it as nearly inert, others as a dangerous poison; nor has the difference been hitherto settled. Hound's tongue has been used as a demulcent and sedative in coughs, catarrh, spitting of blood, dysentery, and diarrhœa: and has been applied externally in burns, ulcers, scrofulous tumours, and goitre. The *pilulæ de cynoglosso*, which are officinal in some parts of Europe, though they contain a portion of the root of hound's tongue, owe their properties chiefly to opium.

DICTAMUS ALBUS. *White Fraxinella. Bastard Dittany.* This is a perennial European plant, the root of which is bitter and aromatic, and has been used as an anthelmintic, emmenagogue, and stomachic tonic, though at present little employed in Europe, and not at all in this country. Störck gave it in intermittents, worms, amenorrhœa, hysteria, epilepsy, and other nervous diseases. The bark of the root is the most active part. The dose in powder is from twenty grains to a drachm or more.

DIPPEL'S ANIMAL OIL. *Oleum Cornu Cervi.* This oil is obtained during the distillation of animal matters, in the processes for obtaining the ammoniacal products on a large scale. That portion which first comes over is pale yellow; but, in the progress of the distillation, it becomes gradually deeper coloured and thicker, and at last black and viscid. It is purified and rendered colourless by redistillation, a pyrogenous resin being left behind. Thus rectified it is a colourless liquid, very limpid and volatile, and having a penetrating, extremely fetid odour, and burning taste. It is soon altered by the action of air and light, becoming thick, yellow, brown, and finally black. It possesses an alkaline reaction, and is alleged by Unverdorben to contain four oily salifiable bases, to which he has given names; but these are of doubtful existence.

This oil was formerly much used in medicine, but its repulsive odour and taste have caused it to be almost entirely laid aside. It acts, in the dose of a few drops, given with water, as a stimulant and antispasmodic. Its presence in the spirit and salt of hartshorn gives to these preparations medicinal properties different from those of the pure carbonate of ammonia.

DIRCA PALUSTRIS. *Leather Wood.* An indigenous shrub, usually very small, but sometimes attaining the height of five or six feet, growing in boggy woods, and other low wet places, in almost all parts of the United States, though less abundantly in the western than in the eastern section. The berries, which are small, oval, and of an orange colour, are said to be narcotic and poisonous. The bark is the part which has attracted most attention. It is extremely tough, and of very difficult pulverization. In the fresh state it has a peculiar rather nauseous odour, and an unpleasant acrid taste, and when chewed excites a flow of saliva. It yields its acrimony completely to alcohol, but imperfectly to water even by decoction. In the dose of six or eight grains, the fresh bark produces violent vomiting, preceded by a sense of heat in the stomach, and often followed by purging. Applied to the skin it excites redness, and ultimately vesicates; but its epispastic operation is very slow. It appears to be analogous in its properties to mezereon, to which it is also botanically allied, as the two barks are derived from plants belonging to the same natural order.

DRAGON'S BLOOD. *Sanguis Draconis.* This is a resinous substance obtained from the fruit of several species of *Calamus*, especially the *C. Rotang* and *C. Draco*, small palms, growing in the Molucca Islands and other parts of the East Indies. On the surface of the fruit, when ripe, is an exudation, which is separated by rubbing, or shaking in a bag, or by exposure to the vapour of boiling water, or finally by decoction. The finest resin is procured by the two former methods. It comes in two forms; sometimes in small *oval masses*, of a size varying from that of a hazelnut to that of a walnut, covered with the leaves of the plant, and connected together in a row like beads in a necklace; sometimes in *cylindrical sticks* eighteen inches long and from a quarter to half an inch in diameter, thickly covered with palm leaves, and bound round with slender strips of cane. In both these forms, it is of a dark reddish-brown colour, opaque, and readily pulverizable, affording a fine scarlet powder. An inferior kind, said to be obtained by boiling the fruit in water, comes in *flat circular cakes*, two or three inches in diameter and half an inch thick. This also yields a fine red powder. A fourth variety, much inferior even to the last mentioned, is in *large disks*, from six to twelve inches in diameter by an inch in thickness, mixed with various impurities, as pieces of the shell, stem, &c., and supposed to be derived from the fruit by decoction with expression. A substance known by the name of Dragon's blood is also derived by exudation from the trunk of the *Dracæna Draco*, a large tree inhabiting the Canary Islands, and another from the *Pterocarpus Draco*, a tree of the West Indies and South America, by incision into the bark. These last, however, are little known in commerce.

Dragon's blood is inodorous and tasteless, insoluble in water, but soluble in alcohol, ether, and the volatile and fixed oils, with which it forms red solutions. According to

Herberger, it consists of 90.7 parts of a red resin which he calls *draconin*, 2.0 of fixed oil, 3.0 of benzoic acid, 1.6 of oxalate of lime, and 3.7 of phosphate of lime. It was formerly used in medicine as an astringent, but is nearly or quite inert, and is now never given internally. It is sometimes used to impart colour to plasters, but is valued chiefly as an ingredient of paints and varnishes.

DUTCH PINK. A yellow or brownish-yellow paint, consisting of clay, or a mixture of clay and chalk, or carbonate of lime in the form of whiting, coloured by a decoction of woad, French berries, or birch leaves, with alum.

EMERY. A very hard mineral, the powder of which is capable of wearing down all other substances except the diamond. As found in commerce, it is said to be derived chiefly from the island of Naxos in the Grecian Archipelago. It is pulverized by grinding it in a steel mill; and the powder is kept in the shops of different degrees of fineness. It is used for polishing metals and hard stones.

EUPHRASIA OFFICINALIS. *Eyebright.* A small annual plant, common to Europe and the United States, without odour, and of a bitterish, astringent taste. It was formerly used in various complaints, and among the rest in disorders of the eyes, in which it was thought to be very efficacious, and in the treatment of which it is still popular in some countries. Its ordinary name arose from its supposed efficacy in improving vision. The probability is that it is nearly inert.

FERROCYANATE OF POTASSA. This is the yellow double cyanuret of potassium and iron, the salt from which the cyanuret of potassium is obtained by calcination. It is prepared on the large scale by calcining animal matters, such as dried blood, horns, &c., with the pearlash of commerce, dissolving the calcined mass after cooling in water, mixing the solution with one of sulphate of iron, until Prussian blue begins to be formed, decanting the liquid, and evaporating it so as first to crystallize the sulphate of potassa, and afterwards the double cyanuret. This salt is in large, transparent, four-sided, tabular crystals, of a lemon-yellow colour, devoid of odour, but possessing a slightly bitter taste. It dissolves in between three and four times its weight of cold water, and in about its own weight at the boiling temperature. When heated to 140° it loses its water of crystallization, amounting to three equivalents and becomes white. It consists, exclusive of water, of two equiv. of cyanuret of potassium, and one of cyanuret of iron.

Medical Properties, &c. The physiological action of this salt has not been well studied. It is asserted by Dr. Wöhler to pass readily into the urine. The only notice we have seen of its use as a medicine is contained in a paper by Dr. Burleigh Smart, of Kennebec, Maine, published in February, 1835. (*Amer. Journ. of Med. Sci.* xv. 362.) According to this writer, its primary effect is that of a sedative, lessening the fulness and frequency of the pulse, and diminishing pain and irritation. It also acts, under favourable circumstances, as a diaphoretic and astringent. Dr. Smart used it with success in a case of chronic bronchitis in a child, with the effect, in a few days, of diminishing the frequency of the pulse, and of lessening the sweating, cough, and dispnœa. It sometimes acts as a diaphoretic, but only in cases attended with excessive vascular action and increased heat of skin. As an astringent, its power is most conspicuous in the colliquative sweats of chronic bronchitis and phthisis. The same power was evinced in several cases of leucorrhœa cured by its use. It sometimes produces ptyalism, unattended, however, by swelling of the salivary glands or fetor of the breath. Its properties as an anodyne and sedative render it applicable to cases of neuralgic pains and whooping cough, in which diseases, especially the latter, Dr. Smart found it useful. When given in an over-dose it occasions vertigo, coldness, and numbness, with a sense of gastric sinking.

For administering this remedy, Dr. Smart prefers the form of solution, in the proportion of two drachms to the fluidounce of water. Of this solution the dose for an adult is from 30 to 45 drops, equivalent to from 10 to 15 grains, repeated every four or six hours. Should the results of Dr. Smart be confirmed by the profession, the ferrocyanate of potassa will form an important acquisition to the Materia Medica.

FRENCH CHALK. A variety of indurated talc. It is compact, unctuous to the touch, of a greenish colour, glossy, somewhat translucent, soft and easily scratched, and leaves a silvery line when drawn over paper. It is used chiefly for marking cloth, &c., and for extracting grease spots.

FUMARIA OFFICINALIS. *Fumitory.* A small annual European plant, naturalized in this country, growing in cultivated grounds, and flowering from May to August. It was formerly considerably improved as a medicine, and is still used in Europe. The leaves are the officinal part. They are inodorous, have a bitter saline taste, and are very succulent, yielding by expression a juice which has the sensible and medicinal properties of the plant. An extract prepared by evaporating the expressed juice, or a decoction of the leaves, throws out upon its surface a copious saline efflorescence. The plant, indeed, abounds in saline substances, and to these in connexion with its bitter extractive, are to be ascribed any medical virtues which it may possess. It is gently tonic, in large doses is said to be laxative and diuretic, and is thought, moreover, to exercise an alterative influence over the system. Both in ancient and modern times it has been esteemed a valuable remedy in visceral obstructions, particularly those of the liver, in scorbutic affections, and in various troublesome eruptive diseases of the skin. Cullen speaks very favourably of its influence in these last complaints. He gave the expressed juice in the dose of two ounces twice a day. Others have prescribed it in much larger quantities. The leaves either fresh or dried may be used in decoction, without precise limitation as regards the dose. The inspissated juice and an extract of the dried leaves have also been employed, and are said to have all the virtues of the leaves themselves.

FUSTIC. A yellow dye-wood, obtained from the *Morus tinctoria* (*Broussonetia tinctoria*, Kunth), a tree growing in the West Indies and South America. It is not used in medicine or pharmacy. According to Bancroft, two different woods bear in England the name of fustic, one the product of the tree just mentioned, distinguished as *old fustic*, probably from the greater magnitude of the billets in which it is imported; the other derived from the *Rhus Cotinus* or *Venice sumach*, and called *young fustic*.

GALANGAL. *Galanga.* Two varieties of this drug are described by authors, the *galanga major* or *large galangal*, and the *galanga minor* or *small galangal*. They are considered by some as the roots of two distinct plants; but there is reason to believe that they are both derived from the *Maranta Galanga* of Linn., the *Alpinia Galanga* of Willd., and that they differ in consequence of the different stages of growth at which they are collected. They are brought from the East Indies. The *larger variety* is cylindrical, three or four inches long, as thick as the thumb or thicker, often forked, reddish-brown externally, slightly striated longitudinally, marked with whitish circular rings, yellowish-reddish-brown internally, rather hard and fibrous, difficultly pulverizable, of an agreeable aromatic odour, and a pungent, hot, spicy, permanent taste. The *small galangal* resembles the preceding in shape, but is smaller, not exceeding the little finger in thickness, of a darker colour, and of a stronger taste and smell. The active principles of galangal are a volatile oil, and an acrid resin. Its medical effects are those of a stimulant aromatic; and it may be used for the same purposes as ginger. It was known to the ancient Greeks and Arabians, and entered into numerous compound preparations, some of which have but recently passed out of use. At present the root is very seldom employed. Its dose is from fifteen to thirty grains in substance, and twice as much in infusion.

GALEGA OFFICINALIS. *Goat's Rue.* A perennial herb, growing in the South of Europe, and sometimes cultivated in gardens. It is without smell unless bruised, when it emits a disagreeable odour. Its taste is uneplasantly bitter and somewhat rough; and when chewed, it stains the saliva yellowish-brown. In former times it was much employed as a remedy in malignant fevers, the plague, the bites of serpents, worms, &c.; but it has now fallen into merited neglect. The roots of the *Galega Virginiana*, which is a native of the United States, are said to be diaphoretic and powerfully anthelmintic. They are given in decoction.

GALIUM APARINE. *Cleavers. Goose-grass.* This is an annual, succulent plant, common to Europe and the United States, growing in cultivated grounds, and along fences and hedges. It is inodorous, and has a bitterish, herbaceous, somewhat acrid taste. The expressed juice is said to be aperient, diuretic, and antiscorbutic; and has been used in dropsy, congestion of the spleen, scrofula, and scorbutic eruptions. In the last complaint it has been thought peculiarly useful. Three ounces of the juice may be taken twice a day. The fresh herb, prepared in the form of ointment or of decoction, has been applied externally to scrofulous swellings with supposed advantage.

GALIUM VERUM. *Yellow Ladies Bed-straw. Cheese-rennet.* This species of Galium is perennial, and a native of Europe. The flowers, which are yellow, have a peculiar, agreeable odour, and have sometimes been given in nervous affections, with a view to their supposed antispasmodic powers. The herb is inodorous, but has an astringent acidulous, bitterish taste. The property of coagulating milk was formerly ascribed to it, but is certainly not constant as the experiment has been frequently tried without success. The bruised plant is sometimes used to colour cheese yellow, being introduced into the milk before coagulation. It is also used for dyeing yellow. The roots of this and of most of the other species dye red; and the plant eaten by animals colours the bones like madder. This species of Galium was formerly highly esteemed as a remedy in epilepsy and hysteria, and was applied externally in cutaneous eruptions. It may be employed either in the form of the recently expressed juice, or of a decoction prepared from the fresh plant. Its medical properties, however, are feeble.

Of the American species, the *G. tinctorium* is closely allied in properties to the G. verum. It is said to be useful in cutaneous diseases; and the root is employed by the Indians for staining their feathers and other ornaments red.

GENISTA TINCTORIA. *Dyers' Broom. Dyers' Weed. Green Weed.* A low shrub, growing wild in Europe, and sometimes cultivated in this country in gardens. The flowering tops of the plant are employed to dye a yellow colour, whence its name was derived. Both these and the seeds have been employed in medicine. It is said that they are purgative and even emetic, especially the seeds, which were formerly used as a cathartic in the dose of a drachm and a half. By some authors they are said to be diuretic, and to be useful in dropsy; but it may be a question whether they were not confounded with the seeds and tops of the common broom (*Spartium Scoparium*). Attention was some years since attracted to the plant as a preventive of hydrophobia, for which purpose it was said to have been long used effectually by the peasants of Podolia, the Ukraine, and other provinces of Russia. It was employed in the form of very strong decoction, both internally and as an application to the bitten part; and its use was persevered in for six weeks: but the trials made with it in other parts of Europe have not justified the hopes which were at first entertained. The Russians are said to use it in connexion with the *Rhus coriaria.*

GERANIUM ROBERTIANUM. *Herb Robert.* This species of Geranium grows wild both in Europe and the United States, but is rare in this country; and Pursh states that the American plant is destitute of the heavy smell by which the European is so well known, though the two agree in all other respects. The herb has a disagreeable, bitterish, astringent taste, and imparts its virtues to boiling water. It has been used internally in intermittent fever, consumption, hemorrhages, nephritic complaints, jaundice, &c., has been employed as a gargle in affections of the throat, and has been applied externally as a resolvent to swollen breasts and other tumours.

GINSENG. This is the root of the *Panax quinquefolium*, a perennial herbaceous plant, belonging to the class and order Pentandria Digynia of the sexual system (Polygamia Diœcia, Linn.), and to the natural order Araliaceæ. The stem is smooth, round, about a foot high, and divided at the summit into three leafstalks, each of which supports a compound leaf, consisting of five, or more rarely of three or seven petiolate, oblong obovate, acuminate, serrate leaflets. The flowers are polygamous, small, greenish, and arranged in a simple umbel, supported by a peduncle, which rises from the top of the stem in the centre of the petioles. The calyx is five-toothed, and the corolla composed of five petals. The fruit consists of kidney-shaped, scarlet berries, crowned with the styles and calyx, and containing two, and sometimes three seeds. The plant is indigenous, growing in the hilly regions of the Northern, Middle, and Western States, and preferring the shelter of thick, shady woods. It is a native also of Chinese Tartary. The root is the part employed. This is collected in considerable quantities in Ohio and Western Virginia, and brought to Philadelphia and other cities on the sea-board for the purpose of exportation to China, where it is highly valued. While supplied exclusively from their own native sources, which furnished the root only in small quantities, the Chinese entertained the most extravagant notions of its virtues, considering it as a remedy for all diseases, and as possessing almost miraculous powers in preserving health, invigorating the system, and prolonging life. It is said to have been worth its weight in gold at Pekin; and the first shipments made from North America to Canton, after the discovery of the root in this country, were attended with enormous profits. But the subsequent abundance of supply has greatly diminished its value, and though it still occasionally forms a part of the investments for Canton, it has become an object of less importance than formerly.

The root is fleshy, somewhat spindle-shaped, from one to three inches long, about as thick as the little finger, and terminated by several slender fibres. Frequently there are two portions, sometimes three or more, connected at their upper extremity, and bearing a supposed, though very remote resemblance to the human figure, from which circumstance it is said that the Chinese name *ginseng* originated. When dried, the root is yellowish-white and wrinkled externally, and within consists usually of a hard central portion, surrounded by a soft whitish bark. It has a feeble odour, and a sweet, slightly aromatic taste, somewhat analogous to that of liquorice root. It has not been accurately analyzed, but is said to be rich in gum and starch. It is sometimes submitted, before being dried, to a process of clarification, which renders it semitransparent and horny, and enhances its value as an article of export. The extraordinary medical virtues formerly ascribed to ginseng, had no other existence than in the imaginations of the Chinese. It is little more than a demulcent; and in this country is not employed as a medicine. Some persons, however, are in the habit of chewing it, having acquired a relish for its taste; and it is chiefly to supply the wants of these that it is kept in the shops.

GLECHOMA HEDERACEA. *Ground-ivy.* A small perennial herb, indigenous in Europe and the United States, and growing in shaded grassy places, as in orchards, and along fences and hedges. It belongs to the family of labiate plants, and shares their general properties. The herb was formerly officinal, and still enjoys some credit as a domestic remedy. It has a peculiar disagreeable odour, and a bitterish, rough, somewhat aromatic taste, and imparts its properties to boiling water. From the statements of authors it appears to be gently stimulant and tonic, with perhaps a peculiar direction to the lungs and kidneys. It has also been considered aperient. The complaints in which it has been most used are chronic affections of the pulmonary and urinary organs; and at one time it had considerable reputation as a remedy in consumption. It has also been employed as a vulnerary and errhine. The usual form in which it was administered was that of infusion, of which a quantity was given for a dose containing the virtues of half a drachm or a drachm of the herb.

GLUE. An impure form of gelatin, obtained from various animal substances by boiling them in water, straining the solution, and evaporating it till upon cooling it assumes the consistence of jelly, dividing the soft mass which results into thin slices, and drying it in the open air. Glue, when of good quality, is hard and brittle, of a brown colour, and equally transparent throughout. It softens and swells up very much in cold water, without dissolving; but is readily dissolved by hot water. It is employed chiefly for cementing pieces of wood together, being too impure for the purposes of a test, or for internal use.

GNAPHALIUM MARGARITACEUM. *Cudweed. Life-everlasting.* An indigenous herbaceous perennial, growing in fields and woods, and flowering in August. The herb of this and of the *G. polycephalum*, or *sweet-scented life-everlasting*, is sometimes used in the form of tea by the country people, in diseases of the chest and of the bowels, and in hemorrhagic affections, and externally, in the way of fomentation, in bruises, languid tumours, and other local complaints; but it probably possesses little medical virtue. Shoepf says that it is anodyne. In Europe, different species of Gnaphalium are also occasionally employed for similar purposes.

GOLD. *Aurum.* The preparations of this metal were introduced to the notice of physicians by Dr. Chrestien of Montpellier in 1810. They are employed both internally, and by frictions on the tongue and gums. The principal affections in which they have been recommended are secondary syphilis, syphilitic ulcerations, scrofula, and inveterate eruptions, particularly those of a leprous character. The chief preparations which have been used up to the present time are metallic gold in a finely divided state, the oxide, the chloride, the double chloride of gold and sodium, and the cyanuret of gold. It may be obtained as a *metallic powder*, by precipitating the nitro-muriatic solution of gold by protosulphate of iron, and as an *oxide*, by treating the same solution with an excess of magnesia, and washing the precipitate, first with water, and afterwards with dilute nitric acid. The *chloride* is obtained by dissolving pure gold in three times its weight of nitro-muriatic acid, by the aid of a moderate heat. The solution is evaporated by a gentle heat nearly to dryness, being at the same time stirred with a glass rod. It is in the form of a crystalline mass of a deep red colour. Its solution has a fine yellow tint. Being deliquescent, it requires to be kept in ground stoppered bottles. *The double chloride of gold and sodium* is prepared by dissolving four parts of gold in nitro-muriatic acid, evaporating the solution to dryness, and dissolving the dry mass in eight times its weight of distilled water. To this solution one part of pure decrepitated common salt is added, previously dissolved in four parts of water. The mixed solution is then evaporated to dryness, being in the mean time constantly stirred with a glass rod. This salt is of a golden yellow colour, and, when crystallized, is in the form of long prismatic crystals, inalterable in the air. The *cyanuret of gold* is best obtained, according to M. Oscar Figuier, as follows. (*Journ. de Pharm. XXe. Année*, p. 599.) Prepare the chloride of gold as neutral as possible by repeated solutions and crystallizations; and to the solution of this salt add, very cautiously, avoiding any excess, a solution of *pure* cyanuret of potassium, so long as any precipitate falls. The precipitate, consisting of cyanuret of gold, is to be washed with pure water, and dried in the dark. The solution of the cyanuret of potassium may be obtained pure and free from formiate and carbonate of potassa, by dissolving in water, soon after its preparation and before it has had time to undergo any change, the residue obtained by calcining the yellow ferrocyanate of potassa.

The preparations of gold are decidedly poisonous, though in different degrees. The chloride is most virulent, and, according to Dr. Chrestien, is even more active than corrosive sublimate. In an overdose, it produces pain, inflammation, and even ulceration of the stomach and bowels, and otherwise acts as a corrosive poison. The general effects of these preparations, in moderate doses, is to produce increased fulness and frequency of the pulse, and to augment the urine and insensible perspiration, without interfering with the appetite or the regular action of the bowels; but if the dose is pushed too far, general irritation is apt to be produced, inflammation seizes upon some organ, according to the predisposition of the individual, and fever is developed.

Metallic gold, the oxide, and *simple chloride* are not as much used as the double chloride of gold and sodium. The oxide may be given, in the form of pill, in the dose of a tenth of a grain, in scrofula, and lymphatic swellings, beginning with one pill daily, and afterwards gradually increasing to seven or eight in the 24 hours.

The *chloride of gold and sodium* is the preparation of gold most commonly employed. It may be given in lozenges, each containing the twelfth of a grain, by mixing intimately five grains of the salt with an ounce of powdered sugar, and making the whole with mucilage of tragacanth into a proper mass to be divided into sixty lozenges. Pills, containing the same dose, may be formed by dissolving ten grains of the dried salt in a drachm of distilled water, and forming the solution into a pilular mass with a mixture of four drachms of potato starch and one drachm of gum arabic, to be divided into one hundred and twenty pills. (*Journ. de Pharm. XXe. Année*, p. 648.) For frictions on the gums and tongue, Chrestien recommends the following formula:—Crystallized chloride of gold and sodium, one grain; powdered orris root, deprived of its soluble parts by alcohol and water and dried, two grains. Mix. At first the fifteenth part of this powder is used daily by frictions; afterwards the fourteenth, the thirteenth, &c. until, increasing gradually, the tenth or eighth part is employed. The use of four grains of the salt in this way is said commonly to cure bad cases of recent syphilis, such, for example, as are characterized by the coexistence of chancres, warts, and buboes. In the preparation of this powder, lycopodium may be substituted with advantage for the orris.

The *cyanuret of gold* is employed, like the preceding preparation, mixed with inert powders in frictions, and in the form of pill. The fifteenth of a grain may be rubbed into the gums daily for fifteen days, next the fourteenth of a grain for fourteen days, and so on, increasing until the dose amounts to the eighth or the ninth of a grain. The dose for internal exhibition is the eighteenth of a grain, gradually increased to the eighth of a grain. The cyanuret of gold has been found very useful in the treatment of syphilis and scrofula by M. Pourché, and is said to be less exciting than the double chloride, when used in those diseases. (*Journ. de Pharm. XXe. Année*, p. 599 *et* 649.)

The different medicinal compounds of gold should not be prepared in pill, powder, or otherwise, until they are wanted for use; as they are liable to decomposition when kept. They should be carefully secluded from the light.

HAMAMELIS VIRGINICA. *Witch-hazel.* An indigenous shrub, from five to fifteen feet high, growing in almost all sections of the United States, usually on hills or in stony places, and frequently on the banks of streams. It is remarkable for the late appearance of its yellow flowers, which expand in September or October, and continue till the weather becomes very cold in winter. The fruit, which is a nut-like capsule not unlike the hazelnut, ripens in the following autumn, and is often mingled on the same plant with the new blossoms. The bark has a bitter, astringent, somewhat sweetish and pungent taste. It appears to have attracted notice as a remedy employed by the Indians, who are said to have applied it as a sedative and discutient to painful tumours, and other cases of external inflammation. It is used in the shape of poultice, or as a wash in the form of decoction, in hemorrhoidal affections and ophthalmia. The leaves are said to possess similar properties, and in the state of infusion to be given internally in bowel complaints and hemorrhages. The seeds are black and shining externally, white, oily, and farinaceous within, and are edible like the hazelnut.

HEDERA HELIX. *Ivy.* This well known evergreen creeper is a native of Europe. The fresh *leaves* have a balsamic odour, especially when rubbed, and a bitterish, harsh, unpleasant taste. They are used externally for dressing issues, and, in the form of decoction, have been recommended in seanious ulcers and cutaneous eruptions, particularly tetter and the itch. Dried and powdered, they have been employed in the atrophy of children, and in complaints of the lungs, in the dose of a scruple or more. The *berries*, which have an acidulous, resinous, somewhat pungent taste, are said to be purgative and even emetic. From the trunks of old plants, growing in the South of Europe and the North of Africa, a resinous substance exudes through incisions in the bark, which has been employed in medicine under the name of *ivy gum.* It is in pieces of various sizes, of a dark yellowish-brown colour sometimes inclining to orange, more or less transparent, sometimes of a deep ruby-red colour internally, of a vitreous fracture, pulverizable, yielding a lively orange-yellow powder, of a peculiar not disagreeable odour when heated or inflamed, and of a bitterish resinous taste. Its chief constituent is resin, though some pieces contain a considerable proportion of bassorin, and others large quantities of ligneous matter. It was formerly used as a stimulant and emmenagogue, but is now scarcely employed. Placed in the cavities of carious teeth, it is said to relieve toothach. The *wood* of the ivy, which is light and porous, is sometimes used for making issue-peas.

HELENIUM AUTUMNALE. *False Sunflower. Sneezewort.* An indigenous perennial herbaceous plant, from three to seven feet high, with large golden-yellow compound flowers, which appear in August. It grows in all parts of the United States, flourishing best in meadows, moist fields, and other low grounds. All parts of it are bitter and somewhat acrid, and when snuffed up the nostrils in the state of powder, produce violent sneezing. The leaves and flowers have been recommended as an excellent errhine. Clayton says that the plant is thought to be useful in intermittent fevers.

HERMODACTYLS. *Hermodactyli.* Under this name are sold in the shops of Europe the roots or bulbs of an uncertain plant, growing in the countries about the eastern extremity of the Mediterranean. By some botanists the plant is considered a species of *Colchicum*, and the *C. variegatum*, a native of the South of Europe and the Levant, is particularly indicated by Fée, Geiger, and others; while by authors not less eminent, the roots are confidently referred to the *Iris tuberosa.* They certainly bear a considerable resemblance to the bulb of the Colchicum autumnale, being heart-shaped, channeled on one side, convex on the other, and from half an inch to an inch in length, by nearly as much in breadth. As found in the shops, they are destitute of their outer coat, of a dirty yellowish or brownish colour externally, white and amylaceous within, inodorous, and nearly tasteless, though sometimes slightly acrid. They are often worm-eaten. Their chief constituent is starch, and they contain no veratria. From this latter circumstance, and from their insipidity, it has been inferred that they are probably not derived from a species of Colchicum; but Geiger observes that they may have lost their acrimony by age. They are in fact almost without action upon the system, and are now seldom used; never, we believe, in this country. It is doubted whether they are the *hermodactyli* of the ancients, which were certainly a powerful medicine, operating very much in the same manner with our colchicum, and like it proving useful in gout and rheumatism.

HIBISCUS ABELMOSCHUS. An evergreen shrub, growing in Egypt, and in the East and West Indies, and affording the seeds known under the name of *semen Abelmoschi, alceæ Ægyptiacæ*, and *grana moschata.* These are of about the same size as flaxseed, kidney-shaped, striated, of a grayish-brown colour, of an odour like that of musk, and of a warm somewhat spicy taste. They were formerly considered stimulant and antispasmodic; but are now used only in perfumery. The Arabs flavour their coffee with them. They are said to be sometimes employed in the adulteration of musk.

HYDRASTIS CANADENSIS. *Yellow Root. Orange Root.* This is an indigenous plant, growing in different parts of the United States, but most abundantly beyond the Alleghanies. It flourishes best in rich shady woods. It has a perennial root, and an herbaceous stem, from six inches to a foot high, with two unequal leaves, and a single terminal whitish or rose-coloured flower. The root consists of a tortuous caudex, and numerous long fibres, and is of a bright yellow colour. It is juicy in the recent state, and loses much of its weight when dried. It has a strong, somewhat narcotic odour, and an exceedingly bitter taste. It probably possesses the ordinary virtues of the vegetable bitters, and is said to be popularly employed as a tonic in some parts of the country. In the form of infusion, it has been used in the Western States as a topical application in ophthalmia; and the Indians are said to employ it in the same manner in old ulcers of the legs. The notion of its efficacy in cancer, originating in a report which reached the late Professor Barton, that it was used in the cure of this complaint by the Cherokees, is probably altogether groundless. The Indians employ the juice of the root to stain their clothing, &c., yellow.

HYPERICUM PERFORATUM. *St. John's Wort.* A perennial herb, abundant both in Europe and in this country, often covering whole fields, and proving extremely troublesome to farmers. It is usually from one to two feet high, with leaves, which from the presence of numerous transparent vesicles, appear as if perforated, and have hence given origin to the botanical designation of the plant. The flowers, which are numerous and of a deep yellow colour, appear during the summer from June to August. The flowering summits are the part used, though the unripe capsules are possessed of the virtues of the plant in an equal degree, and the seeds are said to be even stronger. St. John's wort has a peculiar balsamic odour, which is rendered more sensible by rubbing or bruising the plant. Its taste is bitter, resinous, and somewhat astringent. It imparts a yellow colour to cold water, and reddens alcohol and the fixed oils. Its chief constituents are volatile oil, a resinous substance, tannin, and colouring matter. As a medicine, it was in high repute among the ancients, and was much employed by the earlier modern physicians.

Among the complaints for which it was used, were hysteria, mania, intermittent fever, dysentery, gravel, hemorrhages, pectoral complaints, worms, and jaundice; but it was, perhaps, most highly esteemed as a remedy in wounds and bruises, for which it was employed both internally and externally. It is difficult to ascertain its exact value as a remedy; but from its sensible properties, and from the character of the complaints in which it has been thought useful, it may be considered, independently of its astringency, as somewhat analogous in medical powers to the turpentines. It formerly enjoyed great reputation for the cure of demoniacs; and the superstition still lingers among the vulgar in some countries. At present, the plant is scarcely used except as a domestic remedy. The summits were formerly given in the dose of two drachms or more. A preparation was at one time officinal, under the name of *oleum hyperici*, made by treating them with a fixed oil. It has a red colour, and is still used in many families as a sovereign remedy for bruises.

ILEX. *Holly.* Several species of this genus of plants are employed in different parts of the world. The *I. Aquifolium*, or *common European holly*, has attracted much attention in France. It is usually a shrub, but in some places attains the magnitude of a middling-sized tree. Different parts of it are used. The viscid substance called birdlime is prepared from the *inner bark.* The *leaves*, which are of a bitter, somewhat austere taste, were formerly much esteemed. They were considered diaphoretic, and in the form of infusion were employed in catarrh, pleurisy, small-pox, gout, &c. Within a few years they have gained some reputation in France as a cure for intermittents, being considered by some as equal, if not superior to Peruvian bark; but the first reports in their favour have not been fully confirmed. They were used in the form of powder, in the dose of a drachm two hours before the paroxysm; and this dose was sometimes repeated frequently in the apyrexia. Their febrifuge virtues are said to depend on a peculiar bitter principle, for which the name of *ilicin* has been proposed. The *berries* are about the size of a pea, red and bitter, and are said to be purgative, emetic, and diuretic. Ten or twelve of them will usually act on the bowels, and sometimes vomit. Their expressed juice has been used in jaundice.

The *Ilex opaca*, or *American holly*, is a middling-sized evergreen tree, growing throughout the Atlantic section of the United States, and especially abundant in New Jersey. It is so similar to the European plant, that it is, by some writers, considered as the same species. It is said to possess the same medical properties.

The *Ilex Paraguaiensis*, or *I. Mate* of St. Hilaire, is the plant which yields the celebrated *Paraguay tea*, so extensively consumed as a beverage in the interior of South America. The leaves, which are the part used, have a balsamic odour, and a bitter taste, and are usually at first disagreeable to the palate. They have a pleasant corroborant effect upon the stomach; but when very largely taken, are said to purge and vomit. They are used in the form of infusion.

The *Ilex vomitoria* of Aiton and Linn., the *I. Cassina* of Michaux, is a handsome evergreen shrub, growing in our Southern States, and especially abundant along the southern coast of Florida. It is the *cassina* of the Indians, who formerly employed a decoction made from the toasted leaves, called *black drink*, both as a medicine, and as a drink of etiquette at their councils. It acts as an emetic. The leaves of the *Ilex Dahoon* of Walter and Michaux, have similar properties, and are also said to have entered into the composition of the black drink.

ILLICIUM FLORIDANUM. *Florida Anisetree.* This is an evergreen shrub or small tree, growing in Florida, along the coast which bounds the Gulf of Mexico. The bark, leaves, and probably also the seed vessels, are endowed with a spicy odour and taste analogous to anise, and might probably be used for the same purposes as this aromatic. It is a question worthy of investigation, whether the capsules of this plant might not be substituted for those of the *Illicium anisatum* or *star aniseed*, which yield much of the oil used in this country under the name of *oil of anise.* (See *Anisum.*) Another species of Illicium, the *I. parviflorum*, a shrub found by Michaux in the hilly regions of Georgia and Carolina, has a flavour closely resembling that of sassafras root.

IMPATIENS FULVA and IMPATIENS PALLIDA. *Touch-me-not. Jewel-weed. Balsam-weed.* These two species of Impatiens, considered by Michaux as varieties of the *I. Nolitangere* of Linnæus, are indigenous, annual, succulent plants, from two to four feet high, growing in low moist grounds in all parts of the Union, and flowering in July and August. They may be known by their tender, juicy, almost transparent stems; by their yellow flowers, which in one species are pale and sparingly punctate, in the other, are deeper coloured and crowded with dark spots; and by their capsules, which burst elastically and curl up with the slightest pressure. They probably possess properties similar to those of the *I. Nolitangere* of Europe, which has an acrid burning taste, and when taken internally, acts as an emetic, cathartic, and diuretic, though considered a dangerous plant, and therefore little used. Dr. Ruan, of Philadelphia, has informed us that he has employed, with great advantage, in piles, an ointment made by boiling the American plants, in their recent state, in lard. The flowers may be used for dyeing a yellow colour. The *I. Balsamina* or *balsam-weed*, *touch-me-not*, *&c.*, of the gardens, is said to possess similar properties with the other species.

IMPERATORIA OSTRUTHIUM. *Masterwort.*. An umbelliferous plant, indigenous in the South of Europe. The root has a strong odour, similar to that of Angelica, and a pungent, biting, aromatic taste, attended with a flow of saliva, and followed by a glowing warmth which remains long in the mouth. It was formerly considered alexipharmic, stomachic, corroborant, emmenagogue, diuretic, and diaphoretic; and was used in a wide circle of complaints with so much supposed success as to have gained for it the title of *divinum remedium.* The fact, however, appears to be, that it is merely a stimulant aromatic, analogous but inferior to Angelica, which has nearly superseded it in European practice. In this country, it is unknown as a remedy, and its vulgar name has been applied to another plant.

INDIAN RED. A purplish-red pigment, brought from the island of Ormus in the Persian Gulf. It is a *red ochre*, and owes its colour to the red oxide of iron.

INDIGO. This well known and highly important dye-stuff, is obtained from various species of *Indigofera*, especially the *I. tinctoria*, *I. Anil*, and *I. argentea;* and is afforded also by other plants, such as the *Wrightia tinctoria*, *Isatis tinctoria*, *Polygonum*, *tinctorium*, *Galega tinctoria*, &c. In the process of preparing it, the plant is macerated in water; fermentation takes place; the liquor becomes of a greenish colour, and in due time is decanted; the colouring principle dissolved by the water absorbs oxygen from the air, and assumes a blue colour, becoming at the same time insoluble; a gradual precipitation takes place, favoured by the addition of lime-water or an alkaline solution; and finally, the precipitated matter having been washed upon linen filters, is dried, shaped usually into cubical masses, and sent into market. Most of the indigo consumed in dyeing, is brought from the East Indies, though considerable quantities are brought also from Guatemala and the northern coast of South America. Indigo is insoluble in water or alcohol, but is readily dissolved by sulphuric acid, which, without destroying its blue colour, so far alters its nature as to render it freely soluble in water, and thus affords a convenient method of applying it to the purposes of dyeing. The solution in sulphuric acid is sometimes kept in the shops under the name of *sulphate of indigo.* According to Berzelius, indigo contains, among other ingredients, four distinct principles;—1. a substance resembling gluten; 2. a brown colouring substance; 3. a red colouring substance; and 4. a blue colouring substance, which is the principle upon which its value as a material for dyeing depends, and which seldom constitutes so much as one half of the indigo of commerce.

Indigo has recently been employed by Dr. Moritz Strahl, with asserted advantage, in epilepsy, hysteria, amenorrhœa, and nephritic pains. In the epileptic cases it was given in the quantity of one drachm, gradually increased to an ounce, daily. During the employment of the remedy the perspiration is bluish, and the urine green. (*Journ. de Pharm.* vi. 328—from *Gräf and Walter's Journal.*)

IODIDE OF AMMONIUM. *Ammonii Iodidum. Hydriodate of Ammonia.* This salt is formed by saturating liquid hydriodic acid with caustic ammonia, and evaporating the solution. It forms a deliquescent saline mass, which crystallizes with difficulty in cubes. It is mentioned by Dr. Pennock as a good remedy in some cases of lepra and psoriasis, made up into an ointment. (*Amer. Journ. of Med. Sciences*, xv. 374.) The proportions employed are from a scruple to a drachm of the salt to an ounce of lard; the weaker preparation being used when the disease is recent, the stronger when it is chronic. The ointment was employed in frictions in the amount of half an ounce, morning and evening. As the iodide decomposes by exposure to the air, the ointment should be kept in well stopped bottles.

IODIDE OF IRON. *Ferri Iodidum.* The protiodide of iron has within a few years been introduced into medical practice. It was first used in Philadelphia by Dr. Samuel Jackson, at whose request it was prepared in the form of solution by Mr. E. Durand. The formula of Mr. Durand, which is an improvement on that of Baup and Caillot, is as follows:—Take of Iodine *ten drachms;* Iron Filings, perfectly pure and unoxidized, *five drachms;* Distilled Water *twelve and a half fluidounces.* Put the iodine in a porcelain capsule, with half the water, and add the filings by small portions, stirring the mixture with a glass rod. The combination soon takes place, and the mixture acquires an orange colour, gradually deepening to a dark red. When the whole of the iron has been added, heat the mixture slowly by means of a sand-bath or spirit-lamp, and stir it constantly. When the union has been completed, the solution becomes colourless, and in this state is filtered; and the residue on the filter is washed with the remaining distilled water, previously heated to the boiling point. The amount of liquid obtained measures twelve and a half fluidounces, and contains about twelve and a half drachms of iodide of iron, or a drachm of the iodide to the fluidounce.

This liquid, in which the iodide of iron may be supposed by solution to be converted into the hydriodate of the oxide, is liable to the defect of becoming deep red by standing; some iodine being set free, and oxide of iron precipitated. We are informed by Mr. Durand, that this defect is remedied by letting the solution stand on some pure iron filings, which constantly reproduce the iodide of iron with any free iodine as soon as disengaged. Iodide of iron has a greenish-black colour, and an austere, astringent taste. It is very deliquescent, and, therefore, requires to be kept in well stopped bottles. Its solution, when well prepared, is of a light orange colour. It acts as a tonic and alterative, and may be given in various diseases in which it is desirable to stimulate the absorbent system; as in scrofulous complaints, and visceral obstructions, attended with deficient action. It has been successfully employed by M. Pierquin in amenorrhæa and leucorrhœa. (*Journ. Phil. Coll. of Pharm.* vi. 178.) The dose of the standard solution of Mr. Durand, which may be called *Liquor Ferri Hydriodatis*, is from five to ten drops, three times a day, given in a little water. M. Pierquin recommends its use in lozenges, made up with powdered saffron and white sugar, each containing a quarter of a grain of the solid salt. For enemata, injections into the vagina, and lotions, two drachms may be dissolved in a pint of water.

IODIDE OF SULPHUR. *Sulphuris Iodidum.* This iodide is prepared by heating slightly a mixture of four parts of iodine with one of sublimed sulphur. The excess of iodine is driven off, and the iodide of sulphur remains, as a grayish mass, very deliquescent and readily decomposed by water. It has been used by M. Biett as an external application, mixed with lard in the proportion of a scruple or half a drachm to the ounce of the fat, for the cure of porrigo, and of certain tuberculous affections of the skin. A drachm may be employed at each friction.

IODIDE OF ZINC. *Zinci Iodidum.* This iodide may be formed by digesting an excess of zinc, in small pieces, with iodine diffused in water. Combination takes place, and by evaporation, a deliquescent, very soluble saline mass is obtained, having a metalline, styptic taste, resembling that of sulphate of zinc. It may also be obtained by heating in a matrass a mixture of 20 parts of zinc and 170 of iodine, and subliming into a vial. When thus prepared, it is in the form of white needles.

Iodide of zinc has occasionally been employed, in the form of ointment, as a substitute for the iodide of potassium, and in solution as an astringent injection, in the proportion of one or two grains to the fluidounce of water. Dr. Ure has proposed an ointment to be made by rubbing up a drachm of the iodide with an ounce of lard, to be applied in the quantity of a drachm twice a day to tumours, in place of the ointment of iodide of potassium.

IODO-HYDRARGYRATE OF POTASSIUM. It has been found by chemists that different iodides will unite together in definite proportions, forming compounds which are called by Berzelius double iodides. Bonsdorf of Finland, and Dr. Hare of Philadelphia, with greater reason, have viewed these combinations as a peculiar kind of salts, in which one of the iodides performs the part of an acid, the other, of a base. The substance, the the name of which is given at the head of this article, is one of these compounds, and was presented to the notice of the profession, as a new remedy of remarkable powers, in February 1834, by Dr. William Channing of New York. (*Amer. Journ. of Med. Sci.* xiii, 388.) It consists of the biniodide of mercury acting as an acid, united with the iodide of potassium as a base. But as these two iodides unite in at least two proportions, it is necessary to indicate the particular combination employed by Dr. Channing in his therapeutic experiments.

In a difficult case of pectoral disease, in which the ordinary remedies had failed, Dr. Channing determined to make trial of one of the iodides of mercury. He selected the biniodide; and in order to have it in the liquid form, it being insoluble in water, he dissolved it in a solution of iodide of potassium (hydriodate of potassa). He was struck with the chemical changes which the compound solution underwent; and on pursuing his observations he found that the two iodides really united by the intervention of the water; for by the assistance of an operative chemist, he was enabled by evaporation to obtain them in union in the form of straw-coloured, needleform, deliquescent crystals. He next found, upon consulting the European authorities, that Bonsdorf, who had taken the lead in investigating similar compounds, had discovered the same salt in 1826.

Dr. Channing analyzed the salt with which he experimented, and found that it consisted of one equiv. of biniodide of mercury, and two of iodide of potassium. This he determined by ascertaining that an aqueous solution of a little more than eight grains of iodide of potassium would dissolve, and combine with, eleven grains of biniodide of mercury, without being liable to decomposition when largely diluted with water.

The combination here indicated corresponds with one of the double iodides of mercury and potassium, as described by Thenard. (*Traité de Chimie*, 6ème *Ed.* iii. 493.) The other is represented by this author as consisting of a single equiv. of each iodide, and appears to correspond with the deliquescent straw-coloured salt obtained by Dr. Channing. When copiously diluted with water, every two equivalents of the compound let fall one equiv. of the mercurial iodide; thus evidently converting the salt into the medicinal double iodide. The same decomposition by the use of abundance of water is noticed by Dr. Channing.

Dr. Channing attributes to the new remedy which he has brought forward, the effects of diffusing excitement, and equallizing the circulation, even in the minutest vessels. In the different cases in which he tried it, he thought he saw evidence of its favourable influence on the lungs, in allaying cough and improving expectoration; on the alimentary canal, in restoring the healthy secretions; on the kidneys, in reviving their activity; on the skin and cellular tissue, in cicatrizing superficial ulcerations; and on the absorbent and exhalent systems, in causing the disappearance of effused fluid. The principal diseases in which he found it useful were chronic bronchitis, hooping cough, tonsillitis, chronic gastro-enteritis, dyspepsia, ascites, anasarca, amenorrhœa, leucorrhœa, eruptions, and scrofula. In some cases of phthisis, it mitigated the symptoms and appeared to prolong life. Such a wide therapeutic application is enough to stagger belief; and indeed we may remark that our strongest objection to these statements in relation to the medicine is, that it has appeared to effect so much.

The average dose of the remedy may be stated at the twelfth of a grain three times a day; but in peculiar constitutions, not more than the forty-eighth, the ninety-sixth, or even the two-hundredth of a grain daily can be borne. For the convenience of physicians who may wish to make trial of the remedy, we give the following formula, deduced from the statements in Dr. Channing's paper. Take of iodide of potassium, three and a half grains; biniodide of mercury (red iodide), four and a half grains; distilled water, a fluidounce. Dissolve first the iodide of potassium and then the biniodide of mercury in the water. The compound salt in this solution may be assumed to amount to eight grains, though there is a small excess of the iodide of potassium. Of the solution, from two to five drops, containing from the thirtieth to the twelfth of a grain, may be given three times a day.

IRISH MOSS. *Carrageen. Fucus crispus*, Linn. *Sphærococcus crispus*, Agardh. *Chondrus crispus*, Greville. This moss grows upon rocks and stones on the coasts of Europe, and is said also to be a native of the United States. It abounds on the southern and western coasts of Ireland. It consists of a flat, slender, cartilaginous frond, three or four inches in length, dilated and very much subdivided at the extremity, with linear divisions, and more or less curled up, so as much to diminish its apparent length. As kept in the shops, it is yellowish and translucent, of a feeble odour, and nearly tasteless. It is insoluble in cold, but is dissolved by boiling water. According to Mr. Feuchtwanger, it contains starch and a large proportion of pectic acid (pectin), with compounds of sulphur, chlorine, and bromine, and some oxalate of lime. (*Journ. of the Phil. Col. of Pharm.* vi. 204.) It is nutritive and demulcent, and, being easy of digestion and not unpleasant to the taste, forms a useful article of diet in cases in which the farinaceous preparations, such as tapioca, sago, arrow-root, barley, &c., are usually employed. It has been particularly recommended in chronic pectoral affections, scrofulous complaints, dysentery, and disorders of the kidneys and bladder. It may be used in the form of decoction, made by boiling a pint and a half of water with half an ounce of the moss down to a pint. Sugar and lemon juice may usually be added to improve the flavour. Milk may be substituted for water, when a more nutritious preparation is required. It is recommended to steep the moss for a few minutes in cold water before submitting it to decoction. Any unpleasant flavour which it may have acquired from the contact of foreign substances is thus removed.

ISATIS TINCTORIA. *Woad. Pastel.* A biennial plant, indigenous in Europe, where it is also cultivated. The leaves have a fugitive pungent odour, and an acrid very durable taste, and have been used in scorbutic affections, jaundice, and other complaints; but the plant is valuable only as the source of a blue dye-stuff, called *woad*, which has been long employed in Europe, though at present nearly superseded by indigo. The leaves are prepared by grinding them to a paste, which is made into balls, placed in heaps, and allowed to ferment. When the fermentation is at an end, the mass falls into a coarse powder, which is the dye-stuff in question.

KALMIA LATIFOLIA. *Laurel. Mountain-laurel. Broad-leafed-laurel. Calico-bush.* This well known evergreen inhabits all sections of the United States, but is particularly abundant on the sides of hills and mountains, which it adorns in summer with its elegant flowers. It is from three to ten feet in height. The leaves are endowed with poisonous, narcotic properties, and have been used in medicine. They are said to prove fatal to sheep and some other animals, but are eaten with impunity by deer, goats, and partridges. Dr. Barton states in his "Collections," that the Indians sometimes use a decoction of the leaves to destroy themselves. It is said that death has been occasioned by eating the flesh of partridges and pheasants which have fed upon them during winter. Dr. Shoemaker has published, in the North American Medical and Surgical Journal, two cases of poisoning which resulted from eating a pheasant, in the craw of which laurel leaves were found. The symptoms were nausea, temporary blindness, pain in the head, difficult breathing, pallid countenance, cold extremities, and very feeble pulse, which in one case was for some time absent at the wrist, in the other beat only forty strokes in the minute. In both instances relief was afforded by vomiting produced by a tablespoonful of flour of mustard mixed with warm water.

Dr. Barton was informed that the powdered leaves were employed by an empyric with success in certain states of fever; and Dr. Thomas, in an inaugural dissertation, published at Philadelphia, A. D. 1802, states that a case of diarrhœa, of eight weeks duration, was cured by a decoction made by boiling an ounce of the leaves in eight ounces of water down to four ounces. Thirty drops were given six times a day; but this quantity produced vertigo, and the dose was afterwards repeated only four times daily. The leaves are said also to have been used advantageously in syphilis. Externally applied in the shape of ointment or decoction, they have been found useful in tinea capitis, psora, herpes, and other cutaneous affections; but some caution is necessary in their application, as, according to Dr. Barton, nervous symptoms have resulted from the external use of the decoction. Dr. Bigelow has seen the recently powdered leaves given in doses of from ten to twenty grains, without perceptible effect.

It is probable that the other species of Kalmia—as the *K. angustifolia*, or *sheep-laurel*, and the *K. glauca*, or *swamp-laurel*, have properties identical with those of the *K. latifolia*.

LABDANUM. *Ladanum.* A resinous substance obtained from various species of Cistus, especially the *C. Creticus*, *C. ladaniferus*, and *C. laurifolius*, small evergreen shrubs, inhabiting the islands of the Grecian Archipelago, and the different countries bordering on the Mediterranean. Upon the leaves and branches of these shrubs a juice exudes, which is collected by means of an instrument resembling a rake, with leather thongs instead of teeth, which is drawn over the plant. The juice adheres to the pieces of leather and is afterwards separated. It is said that labdanum was formerly collected by combing the beards of goats which had been browsing upon the leaves of the cistus. It comes chiefly from the Grecian islands. Two varieties exist in commerce. The *purest labdanum* is in masses of various sizes, sometimes weighing several pounds, enclosed in bladders, of a dark-red almost black colour externally, grayish internally when first broken, of the consistence of a plaster, softening in the hand and becoming adhesive, of an agreeable balsamic odour, similar to that of amber, and of a bitter, balsamic, somewhat acrid taste. It is very inflammable, burning with a clear flame. On exposure it becomes dry, porous, and brittle. Little of this variety is found in the markets. *Common labdanum* is in pieces of a contorted or spiral form, light, porous, blackish-gray, hard and brittle, not softening between the fingers, similar in odour and taste to the preceding variety, but less inflammable, and mixed with much sand and other earthy matter, which are obvious to the sight. Guibourt found in 100 parts of the labdanum in masses, 86 parts of resin with a little volatile oil, 7 parts of wax, 1 of watery extract, and 6 of earthy substances and hair. In the contorted variety, Pelletier found 20 per cent. of resin, 3.6 of gum with malate of lime, 0.6 of malic acid, 1.9 of wax, 1.9 of volatile oil including loss, and 72 of ferruginous sand.

Labdanum is a stimulant expectorant, and was formerly given in catarrhal and dysenteric affections. At present it is employed only as an ingredient in plasters, and seldom even for that purpose in the United States. It is sometimes used in fumigation.

LAC. A resinous substance obtained from several trees growing in the East Indies, particularly from the *Croton lacciferum*, and two species of Ficus, the *F. religiosa* and *F. Indica.* It is found in the form of a crust surrounding the twigs or extreme branches, and is generally supposed to be an exudation from the bark, owing to the puncture of an insect belonging to the genus *Coccus*, and denominated *C. Lacca.* By some it is thought to be an exudation from the bodies of the insects themselves, which collect in great numbers upon the twigs, and are embedded in the concreted juice, through which the young insects eat a passage and escape. Several varieties of lac are known in commerce. The most common are *stick lac*, *seed lac*, and *shell lac.*

Stick lac is the resin as taken from the tree, still encrusting the small twigs around which it originally concreted. It is of a deep reddish-brown colour, of a shining fracture, translucent at the edges, inodorous, and of an astringent, slightly bitterish taste. Its external surface is perforated with numerous minute pores, as if made by a needle; and when broken it exhibits manyo blong cells, often containing the dead insect. When chewed, it colours the saliva, and when burnt, diffuses a strong agreeable odour. It imparts a beautiful red colour to the saliva, and is in great measure soluble in alcohol. Little of this variety is imported.

Seed lac consists of minute irregular fragments broken from the twigs, and partially exhausted by water. It is of a light or dark brown colour, inclining to red or yellow, feebly shining, almost tasteless, and capable of imparting to water less colour than the stick lac, sometimes scarcely colouring it at all. It is occasionally mixed with small fragments of the twigs.

Shell lac is prepared by melting the *stick* or *seed lac* previously deprived of its soluble colouring matter, straining it, and pouring it upon a flat smooth surface to harden. It is in thin fragments of various sizes, from half a line to a line thick, often somewhat curved, of a lighter or darker brown colour, inclining more or less to red or yellow, shining, more or less transparent, hard and brittle, inodorous and insipid, insoluble in water, but easily and almost entirely soluble in alcohol, especially with the aid of heat.

A variety of lac is mentioned by writers, in the form of cakes, called cake or lump lac (*lacca in placentis*); but this is at present rare in commerce.

According to John, lac consists of resin, colouring matter, a peculiar principle insoluble in alcohol, ether, or water, called *laccin*, a little wax, and various saline matters in small proportion. The resin, according to Unverdorben, consists of several distinct resinous principles differing in their solubility in alcohol and ether. The laccin is nearly or quite wanting in the *shell lac*, which also contains scarcely any of the colouring principle. Mr. Hatchet found in *stick lac* 68 per cent. of resin and 10 of colouring matter; in *seed lac* 88.5 per cent. of resin and 2.5 of colouring matter; in *shell lac* 90.9 per cent. of resin and 0.5 of colouring matter. The other constituents, according to this chemist, are wax and gluten, besides foreign matters.

Lac in its crude state is slightly astringent, and was formerly used in medicine. At present it is not employed. Shell lac is wholly inert. Stick lac and seed lac are used on account of the colouring principle which they contain. Shell lac, as well as the other varieties deprived of their colouring matter, is applied to numerous purposes in the arts. It is the chief constituent of sealing wax. The best *red sealing wax* is made by melting together, with a very gentle heat, 48 parts of shell lac, 19 of Venice turpentine, and 1 of balsam of Peru, and mixing with the melted mass 32 parts of finely powdered cinnabar. But common rosin is often substituted in part for the lac, and a mixture of red lead and chalk for the cinnabar. The best *black sealing wax* consists of 60 parts of lac, 10 of turpentine, and 30 of levigated bone black; the best *yellow sealing wax* of 60 parts of lac, 12 of turpentine, and 24 of chromate of lead. (*Berzelius.*) Lac is also used as a varnish, and forms an excellent cement for broken porcelain and earthenware.

LAKES. These are compounds of vegetable or animal colouring principles with alumina or metallic oxides, and are usually obtained by adding alum, or permuriate of tin, to the solution of the colouring matter in water, and precipitating by means of an alkali. The alumina or oxide of tin unites with the colouring matter at the moment of separation, and forms an insoluble compound. Lakes are obtained in this way from cochineal, madder, Brazil wood, seed lac, French berries, &c. They are used in painting.

LAURUS BENZOIN. *Spice-wood. Spice-bush. Fever-bush.* An indigenous shrub, from four to ten feet high, growing in moist, shady places, in all parts of the United States. Its flowers appear early in spring, long before the leaves, and are succeeded by small clusters of oval berries, which when ripe, in the latter part of September, are of a shining crimson colour. All parts of the shrub have a spicy, agreeable flavour, which is strongest in the bark and berries. The small branches are sometimes used as a gently stimulant aromatic, in the form of infusion or decoction. They are said to be employed in this way by the country people, as a vermifuge, and an agreeable drink in low fevers. Dr. William Barton says that the bark, as he has been informed, is extensively used in the country, and with much success, in intermittents. The berries, dried and powdered, were sometimes substituted, during the revolutionary war, for allspice. According to Dr. Drake, the oil of the berries is used as a stimulant.

LEDUM PALUSTRE. *Marsh Tea. Rosmarinus sylvestris.* A small evergreen shrub, growing in swamps and other wet places, in the northern parts of Europe, Asia, and America, and in the mountainous regions of more southern latitudes. The leaves have a balsamic agreeable odour, and an aromatic, camphorous, bitter taste; and contain, among other ingredients, volatile oil and tannin. They are thought to possess narcotic properties, and have been employed in exanthematous diseases to allay febrile irritation, in hooping-cough, in dysentery, and in various cutaneous affections, particularly leprosy and scabies. In complaints of the skin, they are used both internally and externally, in the form of decoction. When placed among clothes, they are said to prevent the attacks of moths. In Germany, they are sometimes substituted for hops in the preparation of beer. The *Ledum latifolium*, or *Labrador tea*, which is a larger plant than the preceding, is a native of North America, growing in damp places in Canada and the northern parts of the United States. The leaves, as in the former species, have an agreeable odour and taste, and are esteemed pectoral and tonic. They are said to have been used as a substitute for tea during the war of independence.

LIATRIS SPICATA. *Gay-feather. Button Snakeroot.* An indigenous perennial plant, growing in natural meadows and moist grounds throughout the Middle and Southern States. It has a tuberous root, and an erect annual stem, which terminates in a spike of beautiful, purple, compound flowers, which appear in August. The root is said by Schoepf to have a terebinthinate odour, and a warm, bitterish, terebinthinate taste; to be possessed of diuretic properties; and to be useful in gonorrhœa and sore throat, being employed internally in the shape of decoction in the former complaint, and as a gargle in the latter. Pursh informs us, that the *L. scariosa*, and *L. squarrosa*, are known in Virginia, Kentucky, and the Carolinas, by the name of *Rattlesnake's master;* and that their roots are employed to cure the bite of the rattlesnake, being bruised and applied directly to the wound, while their decoction in milk is taken internally. According to Dr. William Barton, all the tuberous-rooted species of Liatris are active plants, and appear to be diuretic.

LIGUSTICUM LEVISTICUM. *Lovage.* An umbelliferous plant, growing wild in the South of Europe, and cultivated in gardens. The whole plant has a strong, sweetish, aromatic odour, and a warm pungent taste. When wounded it emits a yellow opaque juice, which concretes into a brownish resinous substance not unlike opopanax. The roots, stem, leaves, and seeds, have all been employed; but the last have the aromatic properties of the plant in the highest degree. They are small, ovate-oblong, somewhat flattened, curved, strongly ribbed, and of a yellowish-brown colour. The medical properties of lovage are closely analogous to those of angelica. It is a stimulant aromatic, and has been employed as a carminative, diaphoretic, and emmenagogue. The best form for administration is that of infusion.

LIGUSTRUM VULGARE. *Privet.* A shrub from four to ten feet in height, growing wild both in Europe and the United States, usually in hedges, and by the roadside. The *leaves*, which have an astringent, bitter taste, and the *flowers*, which are small, snow-white, and of an agreeable odour, have been used, in the form of decoction, in sorethroat, and aphthous and scorbutic ulceration of the mouth. The *berries* are black, have a sweetish, bitter taste, and are said to possess purgative properties, and to colour the urine brown. They are sometimes used for dyeing.

LILIUM CANDIDUM. *Common White Lily.* This well known plant is a native of Syria and Asia Minor, but has been long cultivated in gardens. The bulb, which consists of imbricated fleshy scales, is without odour, but has a peculiar, disagreeable, somewhat bitter and mucilaginous taste. It contains much mucilage, and a small proportion of an acrid principle, which is dissipated or destroyed by roasting or boiling. In the recent state it is said to have been employed with advantage in dropsy. Boiled with water or milk it forms a good emollient cataplasm, more used in popular than in regular practice. The flowers have an agreeable odour, which they impart to oil or lard; and an ointment or liniment is sometimes prepared from them, and used as a soothing application in external inflammations.

LIQUIDAMBAR STYRACIFLUA. *Sweet-gum.* An indigenous tree, growing in different parts of the United States from New England to Louisiana, and flourishing also in Mexico, where, as well as in our Southern States, it sometimes attains a great magnitude. In warm latitudes a balsamic juice flows from its trunk when wounded. This has attracted some attention in Europe, where it is known by the name of *liquidamber*, or *copalm balsam*, and is sometimes, though erroneously, called *liquid storax*. It is not afforded by the trees which grow in the Middle States, and is obtained from Mexico and Louisiana. It is a liquid of the consistence of thin honey, more or less transparent, of a yellowish colour, of a peculiar, agreeable, balsamic odour, and a bitter, warm, and acrid taste. By cold it becomes thicker and less transparent. It concretes also by time, assuming a darker colour. According to M. Bonastre, it contains a colourless volatile oil, a semi-concrete substance which rises in distillation and is separated from the water by ether, a minute proportion of benzoic acid, a yellow colouring substance, an oleo-resin, and a peculiar principle, insoluble in water and cold alcohol, for which M. Bonastre proposes the name of *styracine*. The proportion of benzoic acid is greatly increased by time. Mr.

Hodgson obtained from a specimen which he examined 4.2 per cent. (*Journ. of the Phil. Col. of Pharm.* vi. 190.)

Another product is said to be obtained from the same tree by boiling the young branches in water, and skimming off the fluid which rises to the surface. It is of a thicker consistence and darker colour than the preceding, is nearly opaque, and abounds in impurities. This also has been confounded with liquid storax, which it resembles in properties, though derived from a different source.

Liquidamber may be employed for the same purpose as storax, but is very seldom used, and is almost unknown in the shops of the United States.

LITHOSPERMUM OFFICINALE. *Gromwell. Milium Solis.* A European perennial, the seeds of which are ovate, of a grayish-white or pearl colour, shining, rather larger than millet seeds, and of a stony hardness, from which the generic name of the plant originated. From an opinion formerly prevalent, that nature indicated remedies adapted to certain diseases by some resemblance between the remedy and the character of the complaint or of the part affected, the seeds of this plant were applied to the treatment of calculous disorders; and they retained their ground in the estimation of physicians as a diuretic, useful in complaints of the urinary passages, long after the superstitious notion in which their use originated had been abandoned. But they are at present considered nearly inert, and are not employed.

LYCOPODIUM CLAVATUM. *Club-moss.* The capsules of this moss, and of others belonging to the same genus, contain a fine dust or powder, which is collected in Switzerland and Germany, and used in the shops of Europe under the name of *lycopodium*, or *vegetable sulphur.* This powder is considered by some as the pollen of the plant, by others as the seed. It is extremely fine, very light, of a delicate yellow colour, inodorous and tasteless, and exceedingly inflammable, so much so that it takes fire like gunpowder when thrown upon a burning body. It is said to be often adulterated with the pollen of the pines and firs, and, what is much worse, with talc and starch. In medicine, it is used as an absorbent application to excoriated surfaces, especially those which occur in the folds of the skin in infants. In pharmacy, it answers the purpose of facilitating the rolling of the pilular mass, and of preventing the adhesion of the pills when formed. It is not much used in this country. The moss itself, from which the powder is derived, has been esteemed diuretic, antispasmodic, &c.; and has been employed, in the form of decoction, in rheumatism, epilepsy, and complaints of the lungs and kidneys; but it has fallen into discredit.

MADAR or MUDAR. See CALOTROPIS GIGANTEA.

MANDRAGORA OFFICINALIS. *Atropa Mandragora*, Linn. *Mandrake. Mandragora.* A perennial European plant, with a spindleshaped root, which is often forked beneath, and is therefore compared, in shape, to the human figure. In former times this root was supposed to possess magical virtues, and was used as an amulet to promote fecundity, &c.; and the superstition still lingers among the vulgar in some parts of Europe. The plant is a poisonous narcotic, somewhat similar in its properties to belladonna, to which it is botanically allied. It was much used by the ancients, with a view to its narcotic effects; and the root has been recommended by some eminent modern physicians, as an external application to scrofulous, scirrhous, and syphilitic tumours. It is unknown as a remedy in the United States.

MEDEOLA VIRGINICA. *Indian Cucumber.* An indigenous perennial herb, growing in all parts of the United States. The root, which in shape and flavour bears a strong resemblance to a small cucumber, is said by Pursh to be eaten by the Indians. According to the late Professor Barton, it has been thought useful in dropsies, and probably possesses diuretic properties. It is figured and described by Dr. William Barton in his Medical Botany.

MELILOTUS OFFICINALIS. *Melilot.* An annual or biennial plant, indigenous in Europe, and growing also in this country. We have two varieties, one with yellow, the other with white flowers, which are considered by some as distinct species. The plant when in flower has a peculiar sweet odour, which by drying becomes stronger and more agreeable, somewhat like that of the tonka bean. Indeed, according to M. Guillemette, the odorous principle of the two substances is identical. (*Journ. de Pharm.* xxi. 172.) The taste of melilot is slightly bitterish. It has little medical power, and, though formerly recommended in various diseases, is at present not employed internally. As a local application, it is used, in the form of decoction or cataplasm, in moderate inflammations, though probably with little other advantage than such as results from the combination of warmth and moisture.

MESEMBRYANTHEMUM CRYSTALLINUM. *Ice-plant.* A biennial plant, growing spontaneously in the South of Europe, and cultivated as a curiosity in colder countries, by the aid of artificial warmth. The stem and under surface of the leaves are covered with crystalline drops, which give the plant the appearance of being coated with ice. The herb is without smell, and has a somewhat saline nauseous taste. It is considered demulcent and diuretic, and has been highly lauded as a remedy in various complaints, especially in those affecting the mucous membrane of the lungs and urinary passages. It has also been used in dropsy. The expressed juice is the form in which the remedy has been generally employed.

MOMORDICA BALSAMINA. *Balsam apple. Balsamina.* An annual climbing plant, a native of the East Indies, but cultivated in our gardens for the sake of the fruit. This is ovate, attenuated towards each extremity, angular, warty, not unlike a cucumber in appearance, of a lively red or orange-yellow colour, easily falling when touched, and spontaneously separating into several pieces. It was formerly highly esteemed as a vulnerary, and is still in use among the common people. A liniment formed by infusing the fruit, deprived of its seeds, in olive or almond oil, is applied to chapped hands, burns, old sores, piles, prolapsus ani, &c.; and the fruit itself is sometimes mashed and used in the form of poultice. According to M. Descourtlitz, it is poisonous when taken internally, having proved fatal to a dog in the quantity of two or three drachms; and an extract prepared from it is said to be useful in dropsy, in the dose of from six to fifteen grains.

MURIATIC ETHER. *Æther Muriaticus.* This ether was discovered by Rouelle, but first obtained in sufficient quantities to examine its properties by Basse. It may be procured by several processes, but the following is the best. Distil a mixture of equal measures of concentrated muriatic acid and alcohol, and receive the product, by means of a curved glass tube, in a tubulated bottle, half filled with water at a temperature between 70° and 80°, and connected by means of a second tube with another bottle, loosely corked, and surrounded by a mixture of common salt with snow or pounded ice. The ether which comes over into the first bottle, is mixed with alcohol and acid, which are retained by the water, while the pure ether passes forward, and is condensed in the refrigerated bottle. This ether must be kept in strong bottles, well secured with ground stoppers covered with leather. Before being opened, the bottle should be cooled down to the freezing point.

Muriatic ether is colourless, has a strong, slightly saccharine, alliaceous taste, and a penetrating, ethereal, alliaceous smell. Its sp. gr. at the temperatare of 41°, is 0.774. It is extremely volatile, entering into ebullition at 54°, so that in summer it may be collected, in the gaseous state, in bell-glasses over water. Its density in the state of vapour is 2.22. When kindled as issuing from a fine orifice, it burns with an emerald-green flame without smoke, diffusing a strong odour of muriatic acid; but when set on fire in quantities, it burns with a greenish-yellow smoky flame. Water dissolves one-fiftieth of its weight of this ether, and acquires a sweetish, ethereal taste, and alcohol unites with it in all proportions. These solutions are not precipitated by nitrate of silver, showing that the muriatic acid present is in a peculiar state of combination. Like sulphuric and nitric ether, it dissolves sulphur and phosphorus, the fat and volatile oils, and many other substances. It consists of one equiv. of muriatic acid 36.42, and one of etherine 28.48 = 64.90; or in volumes, of two volumes of the acid, and one volume of the vapour of etherine, condensed into two volumes.

Muriatic ether, like the other substances of this class, is a diffusible stimulant, but owing to its extreme volatility, cannot be kept in the shops. It may, however, be preserved in a cool cellar, the temperature of which does not rise above 45° or 50°, being well secured in bottles, which should be placed reversed. When used in medicine, it is generally mixed with an equal bulk of alcohol, when it is called *alcoholic muriatic ether.* The dose is from five to thirty drops, given in sweetened water, or other convenient vehicle.

MUSHROOMS. *Fungi.* Bot. This extensive family of cryptogamous plants is interesting to the physician, from the consideration, that, while some of them are very largely consumed as food in different parts of the world, others are deleterious in their nature, and capable, when eaten, of producing poisonous effects. Their substance is made up of a cellular tissue, which is usually of that soft consistence denominated fungous, but is sometimes corky, ligneous, or even gelatinous. Many of them have an agreeable odour and taste, while others are unpleasant or offensive both to the nostrils and palate. According to Braconnot, most of them contain, among other substances, a peculiar principle denominated *fungin*, a peculiar acid called *fungic acid* usually combined with potassa, and a peculiar saccharine matter less sweet than the other varieties of sugar, less soluble in alcohol and water than that of the cane, and distinguished by some writers as the *sugar of mushrooms. Fungin* constitutes the basis of these vegetables, and is the principle upon which their nutritive properties chiefly depend. It is the fleshy substance which remains when they are treated with boiling water holding a little alkali in solution. It is whitish, soft, and insipid; inflammable; insoluble in water, alcohol, ether, weak sulphuric acid, and weak solutions of potassa and soda; soluble in heated muriatic acid; decomposed by nitric acid, and by concentrated alkaline solutions; and decomposed by destructive distillation into substances resembling those which result from the distillation of animal matters.

It is highly important for those who employ mushrooms as food, to be able to distinguish those which are wholesome from the poisonous. The following general rules are given by M. Richard in the Dictionnaire des Drogues. Those should be rejected which have a narcotic or fetid odour, or an acrid, bitter, or very acid taste; which occasion a sense of constriction in the throat when swallowed; which are very soft, liquifying, changing colour, and assuming a bluish tint upon being bruised; which exude a milky, acrid, and styptic juice; which grow in very moist places, and upon putrefying substances; in fine, all such as have a coriaceous, ligneous, or corky consistence. The last, however, are injurious in consequence rather of their indigestible than of their poisonous nature. Even mushrooms which are usually edible, may prove poisonous, if collected too late, or in places which are too moist. It is said, moreover, that the poisonous species sometimes become innocent when they grow under favorable circumstances; and that the most noxious may be rendered edible by boiling them in water acidulated with vinegar. Immense quantities of mushrooms are eaten in France, Germany, Italy, and other parts of continental Europe: and it is asserted that they constitute the chief food of the people in certain provinces.

The symptoms produced by the poisonous mushrooms, are anxiety, nausea, faintness, vomiting, and if they are not rejected from the stomach, somnolence, stupor, small and intermittent pulse, tension of the abdomen, cold extremities, livid skin, and death in thirty-six or forty-eight hours. Sometimes violent pains in the stomach and bowels are experienced; and occasionally severe vomiting and purging occur and save the patient. The remedies are emetics, if the physician is called in time, accompanied with the free use of warm drinks, and followed by cathartics. After the evacuation of the alimentary canal, demulcent and nutritive beverages should be given, and the strength of the patient sustained by mild tonics or stimulants. Ether is particularly recommended. (*Merat* and *De Lens.*)

Some of the poisonous species have been used as medicines; but in this country they are never employed; and too little seems to be precisely known of their modes of action, and their qualities, even in the same species, vary too much, according to the circumstances of their growth and situation, to justify their introduction into the Materia Medica, without further investigation.

MUSK, ARTIFICIAL. *Moschus Factitius.* This is prepared by adding, drop by drop, three parts of fuming nitric acid to one of *unrectified* oil of amber. The acid is decomposed, and the oil converted into an acid resin, which must be kneaded under pure water, until all excess of acid is removed. The substance which remains is the artificial musk, and is of a yellowish-brown colour, viscid, and of an odour which recalls that of musk. It reddens litmus, dissolves sparingly in water, and more freely in alcohol. According to Setterberg, it contains three resins, two of which are soluble in boiling oil of turpentine; the third, insoluble. One of the soluble resins is obtained upon the cooling of the oil when it separates; the other by evaporating the cold oil from which the first has precipitated. (*Berzelius. Traité de Chim.* vi. 714.)

Dr. S. W. Williams, in a paper contained in the Boston Medical and Surgical Journal, gives the following formula for the preparation of artificial musk:—Add gradually, drop by drop, *three drachms and a half* of concentrated nitric acid to *a drachm* of *rectified* oil of amber, contained in a glass tumbler, or very large wineglass. The mixture grows hot, and emits offensive fumes which the operator must avoid. When the ordinary nitric acid is employed, which is not of full strength, the reaction must be assisted by heat; in which case Dr. Williams recommends that the vessel containing the mixed ingredients be placed in a plate before the fire, they being, meanwhile, continually stirred with a glass rod. The reaction is sometimes so violent as to eject part of the contents from the glass. After the mixture has remained at rest for twenty-four hours, it acquires a resinous appearance, and divides into two portions, an acid liquid below, and a yellow resin above, resembling musk in smell. This being thoroughly washed, first with cold and then with hot water, until all traces of acid are removed, is the artificial musk. (*Amer. Journ. of Pharm.* viii. 14. *April*, 1836.)

Artificial musk is an antispasmodic and nervine, and possesses the general therapeutic properties of the natural substance, though in a weaker degree. It is praised by Dr. Williams, from his personal experience, in the treatment of hooping cough, typhoid states of fever, and nervous diseases generally. When combined with water of ammonia, compound spirit of lavender, or laudanum, he has found no remedy so efficient in the sinking faintness, occurring in the last stages of pulmonary consumption. The average dose for an adult is ten grains; for a child of two years old from half a grain to a grain, repeated, in each case, every two or three hours. It may be prepared as the musk mixture, or with almonds in the form of emulsion. According to Berzelius, the tincture is formed by dissolving *a drachm* of artificial musk in *an ounce* of alcohol, equivalent to *ten fluidrachms* of the sp. gr. of 0.835. Of this the dose for an adult is a teaspoonful. The tincture recommended in the American Journal of Pharmacy (a drachm of the musk to four ounces of alcohol) is altogether too spirituous. Though artificial musk is not equal in power to the natural substance when genuine; yet it is in all probability superior to the adulterated article, so frequently sold under the name of musk. On this account, as well as in view of its comparative cheapness, it forms a useful substitute for musk, applicable to several forms of disease.

MYROBALANS. *Myrobalani.* These are the fruits of various East India trees, particularly of different species of Terminalia. They are noticed here partly on account of their ancient reputation, partly because they are still occasionally to be found in the shops, though seldom, if ever, used in medicine. Five varieties are distinguished by authors. 1. *Myrobalani belliricæ.* These are obtained from the *Terminalia Bellirica.* They are roundish or ovate, from the size of a hazelnut to that of a walnut, of a grayish-brown colour, smooth, marked with five longitudinal ribs, and sometimes furnished with a short thick footstalk. They consist of an exterior, thin, firm, resinous, brown, fleshy portion, and an interior kernel, which is light brown, inodorous, and of a bitterish very astringent taste. 2. *Myrobalani chebulæ.* This variety is produced by the *Terminalia Chebula.* The fruit is oblong, pointed at each extremity, from fifteen to eighteen lines in length, of a dark brown colour, smooth and shining, with five longitudinal wrinkles, but without footstalks. In their internal arrangement and taste, they resemble the preceding. 3. *Myrobalani citrinæ*, vel *flavæ.* These are from a variety of the same tree which affords the last mentioned myrobalans, from which they differ only in being somewhat smaller, of a light brown or yellowish colour, and of a taste rather more bitter. They have been sometimes sold in the shops in Philadelphia under the name of *white galls*, to which, however, they bear no other resemblance than in taste. 4. *Myrobalani Indicæ*, vel *nigræ.* These are thought to be the unripe fruit of the *Terminalia Chebula*, or *T. Bellirica.* They are ovate oblong, from four to eight lines long, and from two to three lines thick, of a blackish colour, wrinkled longitudinally, and presenting, when broken, a thick, brown mass, without kernel, but with a small cavity in the centre. They are sourish and very astringent. 5. *Myrobalani emblicæ.* This variety is wholly different from the preceding, and derived from a plant having no affinity to the Terminaliæ—namely, the *Phyllanthus Emblica* of Linnæus. It is often in segments, as kept in the shops. When the fruit is entire, it is blackish, spherical, depressed, of the size of a cherry, presenting six obtuse ribs with as many deep furrows, and separating into six valves, with a strongly astringent and acidulous taste.

These fruits were in high repute with the Arabians, and were long employed by European practitioners as primarily laxative, and secondarily astringent, in various complaints, particularly diarrhœa and dysentery. Their dose was from two drachms to an ounce. They are not now employed as medicines. We have been told that they have sometimes been used as a substitute for galls in the preparation of inkpowder.

NAPLES YELLOW. A yellow pigment prepared by calcining a mixture of lead, common sulphuret of antimony, dried alum, and muriate of ammonia, or a mixture of carbonate of lead, *diaphoretic antimony*, (a compound of peroxide of antimony and potassa, made by deflagrating one part of sulphuret of antimony with three of nitre,) dried alum, and muriate of ammonia. (*Gray.*)

NARCISSUS PSEUDO-NARCISSUS. *Daffodil.* This well known bulbous plant is a native of Europe, but is very common in the gardens of this country, where it attracts attention by the early appearance of its conspicuous yellow flowers. Both the bulb and flowers have been used in medicine. The latter have a feeble peculiar odour, and both have a bitter mucilaginous taste. They are emetic, though uncertain in their operation. It is probable that the flowers of the wild plant are more powerful than those of the cultivated. They may be given dried and powdered, or in the form of extract. The dose of the powder, to produce an emetic effect, varies, according to the statements of different physicians, from a scruple to two drachms; while the extract is said to vomit in the dose of two or three grains. It is conjectured that the emetic property is developed by the agency of water. The bulb is most powerful in the recent state, and, within our own knowledge, is occasionally used as an emetic in domestic practice in this country. When dried and powdered, it has been given in the dose of thirty-six grains without vomiting. The flowers are said also to possess antispasmodic powers, and have been used in France, with supposed advantage, in hooping-cough, epilepsy, and other convulsive affections. It is probable, however, that they operated in these cases by their nauseating or emetic property. They have, moreover, been advantageously employed in diarrhœa, dysentery, and intermittent fever. Other species of Narcissus are said to possess the same properties, though they have not been so much used.

NARD. *Spikenard.* Several aromatic roots were known to the ancients under the name of *nardus*, distinguished, according to their origin or place of growth, by the names of *nardus Indica*, *nardus Celtica*, *nardus montana*, &c. They are supposed to have been derived from different species of *Valeriana*. Thus the nardus Indica is referred to the *V. Jatamensi* of Bengal, the nardus Celtica to the *V. Celtica*, inhabiting the Alps, Apennines, &c., and the nardus montana to the *V. tuberosa*, which grows in the mountains of the South of Europe. The Indian nard, or spikenard, sometimes also called Syrian nard, is still occasionally to be found in the shops. It is a small, delicate root, from one to three inches long, beset with a tuft of soft, light-brown, slender fibres, of an agreeable odour, and a bitter, aromatic taste. It was formerly very highly esteemed as a medicine, but is now almost out of use. Its properties are analogous to those of the officinal valerian.

NASTURTIUM OFFICINALE. R. Brown. *Sisymbrium Nasturtium*, Linn. *Water-cress.* A small, perennial, herbaceous, succulent plant, growing in springs, rivulets, and ponds, in North America, Europe, and some parts of Asia. The fresh herb has a quick penetrating odour, especially when rubbed, and a bitterish, pungent taste, but loses both when dried. In sensible and medical properties it bears some resemblance to scurvy-grass, though milder, and on this account is preferred for the table. It is thought to be useful in scorbutic affections, and visceral obstructions. The expressed juice is sometimes given in the dose of one or two ounces; but the herb is more frequently used in the form of a salad. Other species of Nasturtium, as the *N. palustre* or *marsh water-cress*, and the *N. amphibium* or *water-radish*, grow in similar situations with the *N. officinale*, and possess similar virtues.

NEPETA CATARIA. *Catmint. Catnep.* This is a well-known perennial herbaceous plant, very common in the United States, but supposed by some to have been introduced from Europe. It is found most abundantly along the roadsides, and may be distinguished by its quadrangular somewhat hoary stem, from one to three feet high, its opposite, petiolate, cordate, dentate, pubescent leaves, green above, and whitish on their under surface, and its whitish or slightly purple, labiate didynamous flowers, which are terminal and axillary, verticillate, somewhat in the form of a spike, and appear in July and August. The herbaceous part is used. It has a strong, peculiar, rather disagreeable odour, and a pungent, aromatic, bitterish, camphorous taste. It yields its virtues to water. Cats are said to be very fond of it. In its operation upon the system it is tonic and excitant, bearing considerable resemblance to the mints, and other labiate plants. It is employed in domestic practice, in the form of infusion, as a remedy in amenorrhœa, hysteria, chlorosis, &c.; but is scarcely known in regular practice. Some of the older medical writers speak favourably of its powers. Two drachms of the dried herb may be given as a dose in infusion.

NIGELLA SATIVA. *Nutmeg flower. Small fennel-flower.* A small annual plant, growing wild in Syria and the South of Europe, and cultivated in various parts of the world. The seeds, which are sometimes kept in the shops under the name of *semen nigellæ*, are ovate, somewhat compressed, about a line long and half as broad, usually three-cornered, with two sides flat and one convex, black or brown externally, white and oleaginous within, of a strong, agreeable, aromatic odour, like that of nutmegs, and a spicy pungent taste. Their chief constituents are a volatile and fixed oil. They are analogous to the other aromatics in properties, and though not at present used in medicine, have been employed in some countries from the remotest times as a condiment.

NITRATE OF SODA. *Cubic Nitre.* This salt may be formed by treating carbonate of soda with nitric acid. It exists naturally, in inexhaustible quantities, in the desert of Atacama in Peru, where it forms a bed of variable thickness, covered with clay, of one hundred and fifty miles in extent. Considerable quantities have been extracted for the purposes of commerce. Occasionally a cargo is brought to the United States.

Nitrate of soda, when pure, is a white salt, crystallizing in rhomboidal prisms, and having a sharp, cooling, and bitter taste. It attracts moisture readily from the air, and dissolves in about twice its weight of water at 60°. As it usually comes from Peru it is in dirty-white saline lumps, rather soft and friable, and damp on the surface. It is cheaper than nitre, for which salt it may be substituted in the manufacture of sulphuric acid, and in the preparation of nitric acid, chrome yellow, &c.

As nitrate of soda has been imposed upon our merchants for nitre, it may be useful to mention that the former salt may be distinguished by its giving rise to an orange-yellow flame when thrown on burning coals, and by the rhomboidal shape of its crystals; those of nitre being long six-sided prisms. (See page 516.)

NYMPHÆA ODORATA. *Sweet-scented Water-lily.* An indigenous herbaceous perennial, growing in most parts of the United States, in fresh-water ponds and the borders of streams, and distinguished by the beauty and delicious odour of its large, white, many-petaled flowers. Its root is, when fresh, large and fleshy, but becomes light, spongy, and friable by drying. It is very astringent and bitter; and, according to Dr. Bigelow, contains much tannin and gallic acid. It is sometimes employed, in the form of poultice, as a discutient application. The root of the *Nymphæa alba*, or European *white water lily*, was esteemed aphrodisiac by the ancients; but has long lost this reputation. Like that of the American plant, it is bitter and styptic, and may have been useful by its astringency in some cases of leucorrhœa, gonorrhœa, dysentery, &c., in which it was formerly employed for its reputed sedative virtues.

OCHRES. These are native mixtures of argillaceous or calcareous earth and oxide of iron, employed in painting. They are prepared for use by agitating them with water, decanting the turbid liquor after the coarser particles have subsided, then allowing it to rest in order that the finer parts may be deposited, and lastly drying the sediment which forms. The colour of the ochres varies with the state of oxidation of the iron, and with the proportion which it bears to the other ingredients, and is sometimes artificially modified by the agency of heat. Several varieties are kept in our shops, under different names, according to their colour, or place of origin. Such are the *brown ochre*, the *yellow ochre*, the *red ochre*, the *Roman ochre* of a brownish-yellow changing by heat to a purple red, the *Oxford ochre* of a brownish-yellow colour less deep than the Roman, and the *French ochre* which is yellow. The *Indian red* from the Persian Gulf, and *Spanish brown*, may also be ranked in this class of pigments. Sometimes ochres come in a powdery state, and sometimes in hard masses; in the latter state they are called *stone ochres.*

OCIMUM BASILICUM. *Basil.* An annual plant, a native of India and Persia, and cultivated in Europe and in this country in gardens. The whole plant has a strong, peculiar, agreeable, aromatic odour, which is improved by drying. The taste is aromatic, and somewhat cooling and saline. Basil has the ordinary properties of the aromatic plants, and is in some places considerably used as a condiment. The seeds are said by Ainslie to be used in India, in the form of infusion, as a remedy in gonorrhœa and nephritic affections.

ŒNANTHE CROCATA. *Hemlock Water-dropwort.* A perennial, umbelliferous, aquatic, European plant, exceedingly poisonous both to men and inferior animals. The root, which has a sweetish not unpleasant taste, is sometimes eaten by mistake for other roots, with the most dangerous effects; and numerous instances of fatal results are on record. The symptoms produced are such as attend irritation or inflammation of the stomach, united with great cerebral disturbance. Externally applied, the root produces redness and irritation of the skin, with an eruptive affection. It is said to be sometimes used empyrically as a local remedy in piles; and a case is recorded, in which an obstinate leprosy was cured by the continued use of the juice of the plant. Other species of *Œnanthe* are poisonous, and the whole genus should be regarded among the suspected plants. We have two or three indigenous species. The proper remedies in cases of poisoning from these plants, are emetics, followed, after the stomach has been thoroughly evacuated, by mucilaginous and other demulcent drinks.

ŒNOTHERA BIENNIS. *Tree Primrose.* A biennial indigenous plant, growing in fields and along fences, from Canada to Carolina. It is from two to five feet high, with a rough stem, alternate, ovate-lanceolate leaves, and fine yellow flowers, which make their appearance in July and August. Schoepf states that it is esteemed useful as a vulnerary. Dr. R. E. Griffith, of Philadelphia, has found a strong decoction of the small branches, with the leaves and cortical part of the stem and larger branches, very beneficial in eruptive complaints, especially tetter. He applies the decoction several times a day to the affected part. He thinks the virtues of the plant reside in the cortical part, which has a mucilaginous taste, and leaves a slight sensation of acrimony in the fauces. (*Journ. of the Phil. Col. of Pharm.* iv. 292.)

OIL OF EUPHORBIA. A fixed oil, obtained from the seeds of the *Euphorbia Lathyris*, a biennial plant growing wild in this country, though believed to have been introduced from Europe, where it is indigenous. It is often found near gardens and in cultivated fields, and is generally called *mole-plant*, under the impression that moles avoid the grounds where it grows. (*Pursh.*) It is the *Caper plant* of England. (*Loudon's Encyc. of Plants.*) Like the other species of euphorbia, it contains a milky juice, which is extremely acrid; and the whole plant possesses the properties of a drastic purge; but the oil of the seeds is the only part used in regular practice. This may be extracted by expression, or by the agency of alcohol or of ether. In the first case, the bruised seeds are pressed in a canvass or linen bag, and the oil which escapes is purified by decanting it from the whitish flocculent matter which it deposites upon standing, and by subsequent filtration. By the latter process, the bruised seeds are digested in alcohol or macerated in ether, and the oil is obtained by filtering and evaporating the solution. According to Soubeiran, however, the oil obtained by these different processes is by no means identical. That procured by expression is probably the purest.

Oil of euphorbia is colourless, inodorous, and, when recent, nearly insipid; but it speedily becomes rancid, and acquires a dangerous acrimony. Soubeiran has ascertained, that it has a complex composition, containing, besides the pure oil, four distinct proximate principles. (*Journ. de Pharm.* xxi. 259.) From 40 to 44 parts are obtained by expression from 100 of the seeds.

This oil is a powerful purge, operating with much activity in a dose varying from five to ten drops. It has within a few years been much used by some Italian and French physicians, who have not found it to produce inconvenient irritation of the stomach or bowels. Its want of taste, and the smallness of the dose, recommend it especially in the cases of infants. It is said to be less acrid and irritating than the croton oil, over which it also has the advantage of greater cheapness. Some trials which have been made with it on this side of the Atlantic have not tended to confirm these favourable reports. It was found uncertain in its cathartic effect, and very liable to vomit. (*Scattergood, Journ. of the Phil. Col. of Pharm.* iv. 124.) It may be given in pill with the crumb of bread, or in emulsion.

OIL OF JASMINE. This oil is obtained from the flowers of the *Jasminum officinale*, or *common white jasmine*, and from those also of the *J. Sambac* and *J. grandiflorum.* Alternate layers of the fresh flowers, and of cotton saturated with the oil of ben (expressed oil of *Hyperanthera Moringa*), or perhaps other fixed oil, are exposed in a covered vessel to the warmth of the sun, the flowers being occasionally renewed, till the oil becomes impregnated with their odour, when it is separated from the cotton by pressure. This method is necessary, as the flowers do not yield their aroma by distillation. The oil of jasmine is used only as a perfume.

ORANGE RED. *Orange Mineral. Sandix.* Red oxide of lead, prepared by calcining carbonate of lead. It is of a brighter colour than *minium*, and is used as a pigment.

OROBANCHE VIRGINIANA. *Epifagus Americanus*, Nuttall. *Beech-drops. Cancer-root.* A parasitic, fleshy plant, with a tuberous, scaly root, and a smooth stem, branched from the base, from twelve to eighteen inches high, furnished with small ovate scales, of a yellowish or purplish colour, and wholly destitute of verdure. It is found in all parts of North America, growing upon the roots of the beech tree, from which it obtained its popular name. It is in some places very abundant. The plant has a bitter, nauseous, astringent taste, which is said to be diminished by drying. It has been given internally in bowel affections; but its credit depends mainly upon the idea that it is useful in obstinate ulcers of a cancerous character, to which it is directly applied in the state of powder. The late Professor Barton, conjectured that it was an ingredient of a secret remedy, at one time famous as *Martin's cancer powder*, of which, however, the most active constituent was arsenious acid.

Other species of Orobanche, growing in America and Europe, have been employed. They are all parasitic, fleshy plants, without verdure, and of a bitter, nauseous taste. In Europe they are called *broom-rape.* The *O. Americana* and *O. uniflora*, of this country, are said to be used for the same purposes as the species above noticed, and like it are called *cancer-root.*

ORPIMENT. *King's Yellow.* A native sulphuret of arsenic, consisting of one equiv. of metal 37.7, and one equiv. and a half of sulphur 24.15=61.85. It is in masses of a brilliant lemon-yellow colour, composed of flexible laminæ, and slightly translucent. It exists in various parts of the world, but is obtained for use from Persia and China. (*Guibourt.*) It is sometimes mixed with realgar, which gives it a reddish or orange hue. A similar sulphuret may be made artificially by passing sulphuretted hydrogen through a solution of arsenious acid in muriatic acid. There is reason to believe that neither the native sulphuret, nor the artificial, when prepared in the manner just mentioned and well washed, is poisonous; at least in a degree at all comparable to other arsenical compounds.

Artificial orpiment is prepared for use by fusing together equal parts of arsenious acid and sulphur. (*Turner.*) In Germany, according to Guibourt, it is prepared by subliming a mixture of these two substances, In this case, however, it retains a large portion of the acid undecomposed, and is therefore highly poisonous. Guibourt found a specimen which he examined, to contain 96 per cent. of arsenious acid, and only 6 per cent. of the sulphuret of arsenic.

Orpiment is used chiefly as a pigment.

ORYZA SATIVA. *Rice.* This is an annual plant, originally, perhaps, derived from the

East Indies, but now cultivated in all parts of the globe where the climate and soil are adapted to its growth. The rice of commerce consists of the seeds of the plant deprived of their husk. Carolina rice was found by Braconnot to contain 85.07 per cent. of starch, 3.60 of gluten, 0.71 of gum, 0.29 of uncrystallizable sugar, 0.13 of fixed oil, 4.80 of vegetable fibre, 5.00 of water, and 0.40 of saline substances. This grain is highly nutritious, and of easy digestion, and constitutes the almost exclusive diet of whole nations. It is admirably adapted to cases of weak bowels, in which there is a strong tendency to diarrhœa. Care, however, should be taken, that it be boiled till it becomes soft. A decoction of rice, usually called *rice-water*, is a good nutritive drink in fevers and inflammatory affections of the bowels, lungs, and kidneys.

OXALIC ACID. *Acidum Oxalicum.* This acid is found both in animals and vegetables. It is generated occasionally in consequence of a diseased action of the kidneys, and deposited in the bladder as an oxalate of lime, forming a peculiar concretion, called from its appearance the mulberry calculus. In vegetables, it occurs in a free state in the bristles of the chick-pea, (*Cicer arietinum*), combined with potassa as a supersalt in the *Rumex acetosa* or common sorrel, and the *Oxalis acetosella* or wood sorrel, and united with lime in several species of lichen, and in the roots of rhubarb, valerian, and of several other plants. It is from the generic appellation *Oxalis*, that it takes its name.

Preparation. This acid may be prepared, by proper management, from the juice of the wood sorrel. The first step is to obtain the binoxalate of potassa in crystals, by a careful evaporation of the juice of the plant. The excess of acid is then neutralized with carbonate of potassa, and the neutral oxalate is decomposed by acetate of lead. In consequence of a double decomposition, a precipitate of oxalate of lead is obtained. This is to be well washed and dried, and decomposed by means of one-third of its weight of strong sulphuric acid, previously diluted with ten times its weight of water. An insoluble sulphate of lead is formed, and the oxalic acid, being liberated, may be made to crystallize by evaporation. The mother waters, by further evaporation, will furnish fresh portions of crystals, until quite exhausted. By this process a very pure acid may be obtained.

The usual process for obtaining oxalic acid consists in decomposing sugar by nitric acid. Four parts of sugar are acted upon by twenty-four parts of nitric acid of the sp. gr. 1.220, and the mixture heated so long as any nitric oxide is disengaged. A part of the carbon of the sugar is converted into carbonic acid by oxygen derived from the nitric acid, which is thereby partially converted into nitric oxide. The undecomposed nitric acid, reacting on the remaining elements of the sugar, generates oxalic and malic acids, the former of which crystallizes as the materials cool, while the latter remains in solution. The crystals being removed, a fresh crop may be obtained by further evaporation. The thick mother water which now remains is a mixture of malic, nitric, and oxalic acids; and by treatment with six times its weight of nitric acid, the greater part of the malic acid will be converted into oxalic acid. The new crop of crystals, however, will have a yellow colour, and contain a portion of nitric acid, the greater part of which may be got rid of by allowing them to effloresce in a warm place.

Many substances besides sugar yield oxalic, by the action of nitric acid; as for example, starch, gum, wool, hair, silk, and many vegetable acids. In every case in which it is thus generated, the proportional excess of oxygen which it contains, compared with every other organic compound, is furnished by the nitric acid. Organic substances yield oxalic acid also when heated with potassa. Thus shavings of wood, if mixed with a solution of caustic potassa, and exposed to a heat considerably higher than 212°, will be partially decomposed and converted into oxalic acid, which then combines with the alkali. This process constitutes, perhaps, the cheapest method of obtaining oxalic acid.

Properties. Oxalic acid is a colourless crystallized solid, possessing considerable volatility, and a strong sour taste. Its crystals have the shape of slender, flattened, four or six-sided prisms, with two-sided summits; and when exposed to a very dry atmosphere, undergo a slight efflorescence. It dissolves in about nine times its weight of cold, and in its own weight of boiling water. The solution of the crystals takes place with slight crepitation. It dissolves also, but not to the same extent, in alcohol. The presence of nitric acid renders it more soluble in water. It combines with salifiable bases, and forms salts called oxalates. The most interesting of these are the three oxalates of potassa, severally called oxalate, binoxalate, and quadroxalate, and the oxalate of lime. The binoxalate of potassa is the *salt of sorrel*, sometimes absurdly called in the shops, the *essential salt of lemons*. It is employed for removing iron moulds from linen, and acts by its excess of acid forming a soluble salt with the peroxide of iron constituting the stain.

This acid has a very strong affinity for lime, and forms with it an insoluble precipitate, consisting of oxalate of lime, whenever the acid and earth are brought into contact. Hence, oxalic acid and its soluble combinations are the best tests we possess for lime; and conversely, a soluble salt of lime, for oxalic acid. When lime is searched for, the oxalate usually employed is the oxalate of ammonia, as being the most convenient. So strong is the mutual attraction between this acid and lime, that the former takes the latter, even from sulphuric acid. Hence, the addition of a soluble oxalate disturbs the transparency of a solution of sulphate of lime.

Oxalic acid is distinguished from all other acids, by the form of its crystals, and by its solution yielding a precipitate with lime-water, insoluble in an excess of the acid.

Composition. Oxalic acid consists of two equivalents of carbon 12.24, and three of oxygen 24=36.24. When crystallized, three equiv. of water 27, must be added, making the equiv. of the crystals 63.24. Two equivalents of this water may be driven off by a regulated heat, by which the acid is made to effloresce; but the third cannot be expelled without destroying the acid itself. Accordingly, as in the case of nitric acid, we have no knowledge of anhydrous oxalic acid in an uncombined state.

From the composition of oxalic acid, as above given, it is plain that this acid corresponds in composition to carbonic acid and oxide, taken together, and is, therefore, intermediate, in the quantity of oxygen which it contains, between this acid and oxide. Notwithstanding it contains less oxygen than carbonic acid, it is incomparably a stronger acid, which circumstance may be accounted for by supposing some peculiarity in the mode in which its constituents are combined. The composition of the acid not only corresponds with the united constituents of carbonic acid and oxide, but there is reason to believe that these two compounds are actually its proximate constituents; for if treated with strong sulphuric acid, the whole of the water will be abstracted, and the elements of the dry oxalic acid will be instantly resolved into equal volumes of carbonic acid and oxide. Oxalic acid seems, therefore, to require one equivalent of water as a bond of union between its elements, without which they arrange themselves in a new binary order.

Oxalic acid combines with salifiable bases in two principal ways. Sometimes it drops its essential equivalent of water, which at other times it retains. Thus the oxalate of lead is a compound of the dry acid and the protoxide of lead; while the oxalate of lime retains the one equivalent of water. Dulong has suggested that the proto-hydrated acid might be viewed as a hydracid, consisting of two equiv. of carbonic acid and one equiv. of hydrogen, and that where the acid appears to lose one equiv. of water, it is made up between the hydrogen of this acid and the oxygen of the base. According to this view, when oxalic acid combines with protoxide of lead, the hydrogen of the acid unites with the oxygen of the protoxide, forming water which is dissipated, while the carbonic acid combines with the metallic lead. For oxalates susceptible of this hypothetical view, Dulong has proposed the name of *carbonides.* Whatever theory we may adopt, it is certain that, in oxalate of lead and similarly constituted oxalates, if we suppose the oxygen of the protoxide transferred to the elements of the oxalic acid, we shall have what corresponds with two equiv. of carbonic acid, and one of metal; but as we know of no instance in which carbonic acid combines directly with a metal, it seems unlikely that Dulong's view will prove correct.

Medical and Toxicological Properties. According to Dr. A. T. Thomson, oxalic acid in *small* doses, largely diluted with water and sweetened to the taste, forms an agreeable, cooling beverage, which may be used in febrile diseases as a substitute for lemonade. Notwithstanding the safety of its employment in this way, it is a virulent poison, producing death with great rapidity and certainty. Instances are on record of its proving fatal in ten minutes, and few survive the effects of a poisonous dose beyond an hour. As this acid is generally kept in the shops, and not a few instances are on record of its fatal effects, when taken by design, or by mistake for Epsom salt, we shall feel ourselves justifiable in being somewhat full on its toxicological relations.

Oxalic acid was first noticed as a poison by Mr. Royston in 1814; since which time it has been principally investigated in this relation by Dr. A. T. Thomson of London, Dr. Percy of Lausanne, Dr. Coindet of Geneva, and Dr. Christison of Edinburgh. Since its properties of certainty and rapidity as a poison have been more generally known, its employment for committing suicide has become more frequent.

From the general resemblance which the crystallized oxalic acid bears to Epsom salt, many fatal mistakes have occurred since the acid has become so extensively an article of commerce, in consequence of its being sold for that saline purgative. Nothing, however, can be easier than to distinguish them; for upon tasting a minute portion of the acid, which may be done with perfect safety, it will be found strongly sour, whereas the salt in question is bitter. Unfortunately, however, in the instances of these fatal mistakes, no suspicions being awakened, the solution is swallowed with the greatest rapidity, and the mischief is done before the victim is aware of his danger.

Oxalic acid acts on the animal economy in two principal ways, according as its solution is concentrated or dilute. When concentrated, it causes exquisite pain, followed by violent efforts to vomit; then sudden dulness, langour, and great debility, and finally death without a struggle. When dilute, it acts in a totally different manner. Dissolved in twenty times its weight of water, it possesses no corrosive, and hardly any irritating power, and yet it operates as a deadly poison, causing death by acting indirectly on the brain, spinal marrow, and heart.

The morbid appearances caused by oxalic acid are various. In a dissection reported by Dr. Christison, the mucous coat of the throat and gullet had an appearance as if scalded, and that of the gullet could be easily scraped off. The inner part of the stomach was pultaceous, in many points black, in others red; and that of the intestines, similarly but less violently affected. In another case recorded by the same author, the whole villous coat of the stomach was either softened or removed, as well as the inner membrane of the œsophagus; so that the muscular coat was exposed, and this coat exhibited a dark gangrenous appearance, being much thickened, and highly injected. The stomach usually contains a dark fluid, resembling coffee-grounds, consisting chiefly of altered blood. In a few cases after death by this acid, no morbid appearances have been discovered.

In the treatment of poisoning by oxalic acid, the remedial measures must be employed with great promptitude. If the antidotes are not at hand and vomiting is not free, emetics will be proper. The stomach pump would be useful; but no delay in the application of other remedies is admissible, in anticipation of its use. Dr. Christison objects to the use of warm water to promote vomiting, from a fear that it would increase the danger by promoting the absorption of the poison; but it may be a question whether this evil, considering the incidental benefit of the water in promoting vomiting, is not less than that of the corrosion of the stomach, which copious dilution has a tendency to prevent. The proper antidote is magnesia or chalk, mixed with water; and as soon as either can be procured, it must be administered in large and frequently repeated doses. Chalk was first proposed for this purpose by Dr. A. T. Thomson, of London. These substances act by neutralizing the poison, forming with it either an insoluble oxalate of magnesia or of lime, both of which are inert. Alkalies as antidotes are inadmissible, as the soluble salts of this acid are likewise poisonous.

The best tests for the detection of oxalic acid in the contents of the stomach or in the vomited matter, in cases of suspected poisoning by this acid, are muriate of lime, sulphate of copper, and nitrate of silver. The first causes a white precipitate of oxalate of lime, known by its being soluble in nitric acid; the second, a bluish-white precipitate of oxalate of copper; and the third, a dense white precipitate of oxalate of silver, which, when dried and heated, becomes brown and detonates faintly. When the antidotes have been freely used during life, the poison will be in the state of oxalate either of lime or magnesia. Here the oxalate found is to be boiled with a solution of carbonate of potassa, whereby an oxalate of potassa will be generated; and this must then be examined by the re-agents above indicated.

OX-GALL. *Fel Bovinum.* The bile of the ox is a viscid fluid, of a green or greenish-yellow colour, a peculiar nauseous odour, and a bitter taste. According to Gmelin, it contains, besides water, 1. a volatile principle, having the odour of musk; 2. a peculiar fatty matter, originally found in biliary calculi, called *cholesterin*; 3. oleic acid; 4. margaric acid; 5. a new acid, called *cholic acid;* 6. a bitter resinous substance, called *biliary resin;* 7. a crystalline principle, called *taurin;* 8. *biliary sugar;* 9 a *colouring substance* upon which the characteristic colour of the bile depends; 10. a kind of extractive matter; 11. a substance analogous to vegetable gluten; 12. caseous matter; 13. salivary matter; 14. albumen; 15. mucus; 16. various saline substances. The resin and sugar, with the colouring matter, appear to be the characteristic constituents. Gmelin considers the *picromel* of Thenard as a mixture of the sugar of the bile with a portion of the resin which it renders soluble in water.

Bile was formerly highly valued as a remedy in numerous complaints, and was considered peculiarly applicable to cases attended with deficient biliary secretion. It is supposed to be tonic and laxative. It is prepared for use by evaporating it to the consistence of an extract. The dose is from five to ten grains. *Refined ox-gall*, much used by limners and painters, is prepared, according to Gray, in the following manner. Take of "fresh ox-gall one pint; boil, skim, add one ounce of alum, and keep it on the fire for some time; to another pint, add one ounce of common salt in the same manner; keep them bottled up for three months, then decant off the clear: mix them in an equal proportion; a thick yellow coagulum is immediately formed, leaving the refined gall clear and colourless."

PÆONIA OFFICINALIS. *Peony.* This well known plant is a native of Southern Europe, but is every where cultivated in the gardens for the beauty of its flowers. The root, flowers, and seed were formerly officinal. The *root* consists of a caudex about as thick as the thumb, which descends several inches into the ground, and sends off in all directions spindleshaped tubers that gradually taper into thread-like fibres, by which they hang together. It has a strong, peculiar, disagreeable odour, and a nauseous taste, which is at first sweetish, and afterwards bitter and somewhat acrid. The odour disappears or is much diminished by drying. Peony root was in very great repute among the ancients, who used it both as a charm and as a medicine in numerous complaints, particularly epilepsy. In modern times it has also been given in epilepsy and various nervous affections, but is at present seldom used. The dose of the fresh root is from two drachms to an ounce, boiled in a pint of water down to half a pint, which should be taken daily. It is said to be less active when dried. The expressed juice of the recent root is recommended in the dose of an ounce. It is milky, of a strong odour, and very disagreeable taste. The *flowers* are usually of a deep-red colour, though in some varieties of a light red, and even whitish. They have, when fresh, an odour similar to that of the root, but feebler, and an astringent, sweetish, herbaceous taste. When dry, they are inodorous. As a medicine they have little power, and are scarcely used. The *seeds* are roundish oval, about as large as a pea, externally smooth, shining, and nearly black, internally whitish, inodorous when dry, and of a mild oleaginous taste. By some authors they are said to be emetic and purgative, and by others are considered antispasmodic. They may be given in the same dose with the roots, but are not used in regular practice.

PAREIRA BRAVA. Under this name the root of a South American plant, said to be the *Cissampelos Pareira*, has been known in Europe since the year 1688, when it was introduced from Brazil. It comes in pieces from the thickness of the finger to that of the arm, two or more feet in length, cylindrical, sometimes contorted, forked, and covered with a thin, firmly adhering, smooth, brown bark. The inner part is ligneous, yellowish, very porous, marked by irregular concentric circles, inodorous, and of a sweetish, nauseous, bitter taste. It is said to be tonic, aperient, and diuretic; and has been recommended as a remedy in calculous affections, ulceration of the kidneys and bladder, leucorrhœa, dropsy, rheumatism, jaundice, and other complaints. The dose of the powder is half a drachm or a drachm. The root was also given in decoction. It is at present scarcely used.

PARIETARIA OFFICINALIS. *Wall Pellitory.* A perennial European herb, growing on old walls and heaps of rubbish. It is inodorous, has an herbaceous, somewhat rough and saline taste, and contains nitre derived from the walls where it flourishes. It is diuretic and refrigerant, and is said also, but without good reason, to be demulcent and emollient. The ancients employed it in various complaints, and it is still considerably used on the continent of Europe, especially in domestic practice. It is given in complaints of the urinary passages, dropsy, and febrile affections, usually in the form of decoction. The expressed juice is also used, and the fresh plant is applied in the shape of a cataplasm to painful tumours.

PATENT YELLOW. *Mineral Yellow.* A pigment, consisting of chloride combined with protoxide of lead. It is prepared by mixing common salt and litharge with a sufficient quantity of water, allowing the mixture to stand for some time, then washing out the liberated soda, and exposing the white residue to heat.

PHELLANDRIUM AQUATICUM, Linn. *Œnanthe Phellandrium*, Lamarck. *Fine-leaved Water-hemlock.* A biennial or perennial, umbelliferous, European water-plant, the fresh leaves of which are said to be injurious to cattle, producing a kind of paralysis when eaten. By drying, they lose their deleterious properties. The *seeds* have been used in Europe, to a considerable extent, in the treatment of disease. They are from a line to a line and a half in length, ovate-oblong, narrower above, somewhat compressed, marked with ten delicate ribs, and crowned with the remains of the calyx and with the erect or reverted styles. Their colour is yellowish-brown, their odour peculiar, strong, and disagreeable; their taste acrid and aromatic. Among their constituents is a volatile oil, upon which their aromatic flavour depends. By different writers they are described as aperient, diuretic, emmenagogue, expectorant, and sedative. They probably unite mild narcotic properties with the stimulant powers which are common to most of the aromatics, and may be directed, according to circumstances, to different secretory organs. In over doses they produce vertigo, intoxication, and other narcotic effects. The complaint in which they appear to have been used most successfully is consumption, probably of the catarrhal character. They have been given also in asthma, dyspepsia, intermittent fever, obstinate ulcers, &c. The dose of the seeds, to commence with, is five or six grains, so repeated as to amount to a drachm in twenty-four hours. They should be given in powder.

PHOSPHORUS. This elementary substance was discovered in 1669 by Brandt, an alchemist of Hamburg; and the process by which it was made, remained a secret until 1737. At first it was obtained from putrid urine, and was exceedingly scarce and costly; but in 1769, Gahn discovered it in bones, and shortly afterwards published a process by which it might be extracted from them; and his method has been followed, with but slight modifications, up to the present time. The mode of preparation is as follows. Calcined bones, which consist principally of phosphate of lime, are digested for twenty-four hours with two-thirds of their weight of strong sulphuric acid, previously diluted with twelve times its weight of water. The sulphuric acid detaches half the lime from the phosphoric acid, and precipitates as sulphate of lime; while a biphosphate of lime remains in solution. The mixture is then strained through a linen cloth to separate the sulphate of lime, and afterwards submitted to evaporation, which causes a fresh precipitation of sulphate, requiring to be separated by a new filtration. The filtered solution of biphosphate is evaporated to a syrupy consistence, and then thoroughly mixed with half its weight of powdered charcoal, so as to form a soft mass, which is dried by being heated to dull redness in an iron pot. The mass when cool is quickly transferred to a coated earthenware retort, furnished with an adopter of copper, bent downwards at right angles so as to enter a bottle with a large neck containing water, which should rise about two lines above the orifice of the adopter. The bottle is closed round the adopter by a cork, which is traversed by a small glass tube, to give exit to the gaseous products. The retort is heated in a furnace, furnished with a dome, in the most gradual manner, so as to occupy about four hours in bringing it to a red heat. Afterwards the heat is pushed vigorously, so long as any phosphorus drops into the water; and this takes place generally for from twenty-four to thirty hours. During this part of the process the excess of acid in the biphosphate is decomposed; its oxygen combining with the charcoal, and the liberated phosphorus distilling over. A quantity of the materials sufficient to fill a quart retort will yield about a pound of phosphorus.

Properties. Phosphorus is a semitransparent solid, without taste, but possessing an alliaceous smell. When perfectly pure it is colourless; but as usually prepared it is yellowish or reddish-yellow. It is flexible, sectile, and when cut exhibits a waxy lustre. It is insoluble in water, but dissolves sparingly in alcohol and the oils, and more freely in ether. Its sp. gr. is 1.77, and its equivalent number 15.71. It takes fire at 100°, melts at 105°, and boils at 550°, air being excluded. During its combustion, it combines with the oxygen of the air, and forms phosphoric acid. On account of its great inflammability it requires to be kept under water. When exposed to the air, it undergoes a slow combustion, emitting white vapours, which are luminous in the dark. It forms three acids with oxygen, the hypophosphorous, phosphorous, and phosphoric, and two compounds with hydrogen, phosphuretted hydrogen and subphosphuretted hydrogen. The only medicinal combinations containing phosphorus are phosphoric acid, and the phosphates of mercury, iron, lime, and soda. The three latter phosphates are officinal.

Medical Properties. Phosphorus, exhibited in small doses, acts as a powerful general stimulant; in large doses, as a violent irritant poison. Its action seems particularly directed to the kidneys and genital organs, producing diuresis, and excitation of the venereal appetite. The latter effect has been conclusively proved by the experiments of Alphonse Leroy, Chenevix, and Bertrand-Pelletier. From its peculiar physiological action, it is considered applicable as a remedy to diseases attended with extreme prostration of the vital powers. It has been recommended in dropsy, impotency, typhus fever, phthisis, marasmus, chlorosis, paralysis, gutta-serena, mania, &c. The best form for exhibition is an ethereal solution, as directed by the Paris Codex, under the title of *Æther Phosphoratus.* This solution contains about three grains of phosphorus to the ounce, and may be given in the dose of ten drops, repeated every two or four hours, according to circumstances, in a small portion of some bland drink. Magendie, in his formulary, published in Paris in 1835, recommends the solution of six grains of phosphorus in an ounce of rectified ether, agreeably to the formula of Bertrand-Pelletier. The solution is effected by cutting the phosphorus in small pieces, and agitating it with the ether, from time to time, for three or four days. Of this solution, he indicates ten drops as the dose; although it is twice as strong as that of the Paris Codex. It has been objected to the ethereal solution, that, upon the evaporation of the ether, the phosphorus is liable to be set free, and may inflame in the stomach. It is on this account that oil has been proposed as a solvent, according to the following formula of M. Lescot. Take of phosphorus *a drachm*, olive or almond oil, *an ounce and a half.* Cut the phosphorus into very small pieces, introduce them into a ground stoppered bottle, and add the oil. Let the mixture stand in a dark place for fifteen days; after which decant, and give the solution an aromatic flavour with the oil of bergamot. This solution is called *Aromatic Phosphoric Oil*, and must be kept in a dark place. It may be given to the extent of twenty-five or thirty drops in the twenty-four hours, mixed with some mucilaginous drink.

Great caution is necessary in the exhibition of phosphorus, and its effects should be closely watched. It ought never to be given in substance; as when thus administered, it is apt to produce violent irritation of the stomach. When taken in substance in a poisonous dose, two or three grains of tartar emetic should be given to dislodge it. If swallowed in the state of solution, then copious draughts of cold water containing magnesia in suspension would be proper, in order to arrest the further combustion of the phosphorus, and to neutralize any acid which may have been formed.

PHYSALIS ALKEKENGI. *Common Winter Cherry.* A perennial herbaceous plant, growing wild in the South of Europe, and cultivated in our gardens. The fruit is a round red berry, about as large as a cherry, enclosed in the calyx, and containing numerous flat kidney-shaped seeds. The berries are very juicy, and have an acidulous, bitterish taste. The calyx is very bitter. By drying they shrink, and become of a brownish red colour. They are said to be aperient and diuretic, and have been highly recommended in suppression of urine, gravel, and other complaints of the urinary passages. From six to twelve cherries, or an ounce of the expressed juice, may be taken for a dose; and even much larger quantities are not injurious. They are consumed to a considerable extent in some parts of Europe as food. The berries of the *Physalis viscosa* of this country, are said by Clayton to be a remarkable diuretic.

PICHURIM BEANS. The seeds of a tree not well known (*Laurus Pichurim*, Richard, *Ocotea Pichurim*, Kunth), growing in Brazil, Guiana, Venezuela, and other parts of South America. The beans are the kernels of the fruit separated into halves. They are ovate-oblong or elliptical, flat on one side, convex on the other, of a grayish-brown colour externally, chocolate coloured within, of an aromatic odour between that of nutmegs and sassafras, and of a spicy pungent taste. There are two kinds, one about an inch and a half long by half an inch in breadth, the other little more than half as large, rounder, and of a dark brown colour. Their virtues depend on a volatile oil. In medical properties they resemble the aromatics in ordinary use, and may be employed for the same purposes. They are very rare in this country.

PIMPINELLA SAXIFRAGA. *Small Burnet Saxifrage. Saxifraga.* A perennial umbelliferous European plant, growing on sunny hills, and in dry meadows and pastures. The root is ranked among officinal remedies in some parts of Europe. It has a peculiar, strong, aromatic, yet unpleasant odour, and a sweetish, pungent, biting, aromatic. bitterish taste. Its active constituents are volatile oil, and an acrid resin. It is considered diaphoretic, diuretic, and stomachic; and has been used in chronic catarrh, asthma, dropsy, amenorrhœa, &c. The dose in substance is about half a drachm, and in infusion two drachms. The root is also used as a masticatory in toothach, as a gargle in palsy of the tongue and in collections of viscid mucus in the throat, and externally to remove freckles.

PINCKNEYA PUBENS, Michaux. A large shrub or small tree, growing in South Carolina, Georgia, and Florida, in low and moist places along the sea coast. It is closely allied, in botanical characters, to the Cinchonæ, with which it is ranked by some botanists, though it certainly does not belong to that genus as defined by De Candolle. The bark is bitter, and has been used with advantage in intermittent fever. Dr. Law, of Georgia, cured six out of seven cases in which he administered it. The dose and mode of preparation are the same with those of cinchona. The chemical composition and medical properties of this bark deserve a fuller investigation than they have yet received.

PLANTAGO MAJOR. *Plantain.* A well known perennial herb, growing in fields, by the roadsides, and in grass plats, and abounding both in Europe and this country. The leaves are saline, bitterish, and austere to the taste, the root saline and sweetish. The plant has been considered refrigerant, diuretic, deobstruent, and somewhat astringent. The ancients esteemed it highly, and employed it in visceral obstructions, hemorrhages, particularly from the lungs, consumption, dysentery, and other complaints. In modern times it has been applied to similar purposes, and the root is said to have proved useful in intermittents. At present, however, it is generally believed to be very feeble, and is little used internally. As an external application it has been recommended in ulcers of various kinds, and in indolent tumours of a scrofulous character. Among the vulgar it is still much used as a vulnerary, and as a dressing for blisters and sores. The dose of the expressed juice is from one to four fluidounces. Two ounces of the fresh root or leaves may be boiled in a pint of water and given during the day. Externally, the leaves are applied in substance or decoction. The *Plantago media*, and the *P. lancifolia* or *rib-grass*, which are also indigenous species, possess properties similar to those of the P. major, and may be used for the same purposes.

Under the name of *semen psyllii*, the seeds of several species of Plantago, growing in different parts of Europe, are sometimes kept in the shops. The best are obtained from the *Plantago Psyllium* or *fleawort*, which grows in the South of Europe and Barbary. They are small, about a line long by half a line in breadth, convex on one side, concave on the other, flea-coloured, shining, inodorous, and nearly tasteless, but very mucilaginous when chewed. They are demulcent and emollient, and may be used internally and externally in the same manner as flaxseed, which they closely resemble in medical properties.

PLUMBAGO EUROPŒA. *Leadwort. Dentellaria.* A perennial, herbaceous plant, growing in the South of Europe. It has an acrid taste, and when chewed, excites a flow of saliva. This is particularly the case with the root, which has been long used to relieve toothach. Hence the plant derived the name of *dentelaire*, by which it is known in France. A decoction of the root in olive oil has been highly recommended for the cure of the itch. Writers differ much in their statements in relation to the activity of the plant, some speaking of it as rubefacient, vesicatory, and caustic, and when swallowed, as violently emetic and liable to produce dangerous irritation of the alimentary canal; while others consider it nearly inert. Perhaps the difference may be ascribed in part to the use of the plant in the recent state in one case, and dried or long kept in the other. A crystallizable, acrid principle, called *plumbagin*, has been extracted from the root by Dulong.

POLYPODIUM VULGARE. *Common Polypody.* A fern belonging both to the old and new continents, and growing in the clefts of old walls, rocks, and decayed trunks of trees. The root, which is the part considered medicinal, is rather long, about as thick as a goosequill, somewhat contorted, covered with brown, easily separable scales, furnished with slender radicles, and marked by numerous small tubercles. As found in the shops, it is sometimes destitute of the scales and radicles. Its colour is reddish-brown with a tinge of yellow, its odour disagreeably oleaginous, its taste peculiar, sweetish, somewhat bitter, and nauseous. The root of the variety growing upon the oak has been preferred, though without good reason. It was deemed purgative by the ancients, who employed it for the evacuation of bile and pituitous humours, in melancholic and maniacal cases. Modern physicians have used it in similar complaints, and as a pectoral in chronic catarrh and asthma. At present, however, it is scarcely ever employed, being considered nearly inert. It was given in doses varying from one or two drachms to an ounce, usually in connection with cathartic medicines.

POPULUS. *Poplar.* Several trees belonging to this genus of plants have attracted some attention in a medical point of view. In most of them, the leaf-buds are covered with a resinous exudation, which has a peculiar, agreeable, balsamic odour, and a bitterish, balsamic, somewhat pungent taste. This is abundant in the buds of the *Populus nigra* or *black poplar* of Europe, which are officinal in some parts of that continent. They contain resin and a peculiar volatile oil. The buds of the *P. balsamifera*, growing in the northern parts of this continent and Siberia, are also highly balsamic; and a resin is said to be furnished by the tree, which is sometimes, though erroneously, called *tacamahac*. The virtues of the poplar buds are probably analogous to those of the turpentines and balsams. They have been used in pectoral, nephritic, and rheumatic complaints, in the form of tincture; and a liniment, made by macerating them in oil, has been applied externally in cases of local rheumatism. The *Unguentum Populeum* of European pharmacy, is made, according to the directions of the Paris Codex, by macerating 500 parts of the fresh buds of the black poplar, in 1500 parts of melted lard for 24 hours, preserving the mixture till the other plants employed arrive at maturity, then adding of the bruised fresh leaves of the black poppy, deadly nightshade, henbane, and black nightshade (*Solanum nigrum*), each 128 parts, boiling the mixture with a gentle fire till the moisture is dissipated, then straining with expression, and allowing the ointment to cool after defecation. This is an anodyne ointment, occasionally employed in Europe as an application in painful local affections.

The bark of some species of poplar is possessed of tonic properties, and has been used in intermittent fever with advantage. Such is the case with that of the *P. tremuloides* or *American aspen*, and of the *P. tremula* or *European aspen*. In the bark of the latter species, Braconnot found *salicin*, and another proximate crystallizable principle which he named *populin*. It is in these principles, probably, that the febrifuge properties of the bark reside. They may be obtained by precipitating a saturated decoction of the bark with solution of subacetate of lead, filtering, precipitating the excess of lead by sulphuric acid, again filtering, evaporating, adding animal charcoal towards the end of the evaporation, and filtering the liquor while hot. Salicin gradually separates, upon the cooling of the liquor, in the form of crystals. If, when this principle has ceased to crystallize, the excess of sulphuric acid in the liquid be saturated by a concentrated solution of carbonate of potassa, the populin will be precipitated. If this be pressed between folds of blotting paper, and redissolved in boiling water, it will be thrown down, upon the cooling of the liquid, in the crystalline state. The leaves of the *P. tremula* also afford populin, and in larger proportion even than the bark. It is probable that both principles exist also in the bark of the *P. tremuloides*, and some other species. Salicin is described under the head of *Salix*. *Populin* is very light, of a pure white colour, and of a bitter, sweetish taste, analogous to that of liquorice. When heated it readily melts into a colourless and transparent liquid. It is soluble in 2000 parts of cold, and about 70 parts of boiling water; and is more soluble in boiling alcohol. Acetic acid and the diluted mineral acids dissolve it, and upon the addition of an alkali, let it fall unchanged.

PORTULACA OLERACEA. *Garden Purslane.* An annual succulent plant, growing in gardens and cultivated grounds in the United States, Europe, and most other parts of the globe. It has an herbaceous, slightly saline taste, and is often used as greens, being boiled with meat, or other vegetables. It is considered a cooling diuretic, and is recommended in scorbutic diseases, and affections of the urinary passages. The seeds have been considered anthelmintic; but they are tasteless and inert.

POTENTILLA REPTANS. *Cinquefoil.* A perennial, creeping, European herb, with leaves which are usually quinate, and have thus given origin to the ordinary name of the plant. The root has a bitterish, styptic, slightly sweetish taste, and was formerly used in diarrhœa and other complaints for which astringents are usually prescribed.

PRUNELLA VULGARIS. *Self-heal. Heal-all.* A small perennial labiate plant, common both in Europe and in the United States, growing especially by the way-sides. It is inodorous, but has an austere bitterish taste. The herb in flower was formerly used, in the state of infusion or decoction, in hemorrhages and diarrhœa, and as a gargle in sore-throat. In this country, it is not employed in regular practice.

PULMONARIA OFFICINALIS. *Lung-wort.* An herbaceous perennial, indigenous in Europe, and sometimes cultivated in this country in gardens. The leaves, which are the part used, are inodorous, and have an herbaceous, somewhat mucilaginous, and feebly astringent taste. They have been considered pectoral and demulcent, and have been employed in catarrh, hæmoptysis, consumption, and other affections of the chest; but their virtues are doubtful, and they were probably applied to the treatment of pectoral complaints as much on account of the supposed resemblance of their speckled surface to that of the lungs, as from the possession of any positively useful properties.

PUMICE STONE. *Pumex.* A very light porous stone, found in the vicinity of active or extinct volcanoes, and believed to have been thrown up during their eruption. The pumice stone of commerce is said to be obtained chiefly from Lipari. It is used whole, in the manner of a file, for removing the outer surface of bodies, or for rubbing down inequalities, and, in the state of powder, for polishing glass, metals, stones, &c.; purposes to which it is adapted by the hardness of its particles.

PYRETHRUM PARTHENIUM, Willd. *Matricaria Parthenium*, Linn. *Chrysanthemum Parthenium*, Pers. *Feverfew.* A perennial herbaceous plant, about two feet high, with an erect, branching stem, pinnate leaves, oblong, obtuse, gashed, and dentate leaflets, and compound flowers borne in a corymb upon branching peduncles. It is a native of Europe, but cultivated in our herb gardens. The whole herbaceous part is used. The plant has an odour and taste analogous to those of chamomile, which it resembles also in the appearance of its flowers, and in its medical properties. Though little employed, it is undoubtedly capable of useful application as a mild tonic.

REALGAR. This is the protosulphuret of arsenic, consisting of one equiv. of arsenic 37.7, and one of sulphur 16.1=53.8. It is found native in Saxony, Bohemia, Transylvania, and in various volcanic regions. Realgar is artificially made by melting arsenious acid with about half its weight of sulphur. (*Turner.*) Thus prepared, it is of a crystalline texture, of a beautiful ruby-red colour, of a uniform conchoidal fracture, somewhat transparent in thin layers, and capable of being sublimed without change. Native realgar is said to be innocent when taken internally, while that artificially prepared is poisonous, in consequence, according to Guibourt, of containing a little arsenious acid. Realgar is used only as a pigment.

RED CHALK. *Reddle.* A mineral substance of a deep red colour, of a compact texture, dry to the touch, adhering to the tongue, about as hard as chalk, soiling the fingers when handled, and leaving a lively red trace when drawn over paper. It consists of clay and oxide of iron, and is intermediate between *bole* and *red ochre*, containing more oxide of iron than the former, and less than the latter. It is used for drawing lines upon wood, &c., and is sometimes made into crayons by levigating and elutriating it, then forming it into a paste with mucilage of gum Arabic, moulding this into cylinders, and drying it in the shade. It has been used internally as an absorbent and astringent.

RESEDA LUTEOLA. *Weld. Dyer's-weed.* An annual European plant, naturalized in the United States. It is inodorous, and has a bitter taste, which is very adhesive. In medicine it has been employed as a diaphoretic and diuretic, but is now neglected. On the continent of Europe it is much employed for dyeing yellow, and before the introduction of quercitron into England, was extensively employed for the same purpose in that country. The whole plant is used.

RIGA BALSAM. *Balsamum Carpaticum. Balsamum Libani.* This is a product of the *Pinus Cembra*, a large tree growing in the mountainous regions and northern latitudes of Europe and Asia. The juice exudes from the extremities of the young twigs, and is collected in flasks suspended from them. It is a thin white fluid, having an odour analogous to that of juniper, and possessing the ordinary terebinthinate properties. In this country it is very rare; but it is occasionally brought from Riga or Cronstadt in bottles. A similar product, called *Hungarian balsam*, is obtained in the same manner, from the *Pinus Pumilio*, growing on the mountains of Switzerland, Austria, and Hungary. It is scarcely known in the United States.

ROTTEN STONE. *Terra cariosa.* An earthy mineral, occurring in light, dull, friable masses, dry to the touch, of a very fine grain, and of an ash-brown colour. It is obtained from Derbyshire in England, and is used for polishing metals.

SALEP. Though not directed by any of the British Colleges, nor by our national Pharmacopœia, this substance deserves a slight notice, as it is frequently mentioned by writers on the Materia Medica, and is occasionally to be found in the shops. The name is given to the prepared bulbs of the *Orchis mascula* and other species of the same genus, belonging to the Linnæan class and order *Gynandria Monandria*, and to the natural family of the *Orchideæ.* The *male orchis* is a native of Europe, the Levant, and northern Africa. Its bulbs, which are two in number, oval or roundish, internally white and spongy, are prepared by removing their epidermis, plunging them into boiling water, then stringing them together, and drying them in the sun or by the fire. By this process they acquire the appearance and consistence which distinguish them as found in the shops. They were formerly procured exclusively from Asia Minor and Persia, but are now prepared in France and perhaps other parts of Europe.

Salep is in small, oval, irregular masses, hard, horny, semitransparent, of a yellowish colour, a feeble odour, and a mild mucilaginous taste. It is sometimes kept in the state of powder. In composition and relation to water it is closely analogous to tragacanth, consisting of a substance insoluble, but swelling up in cold water (*bassorin*,) of another in much smaller proportion, soluble in cold water, and of minute quantities of saline matters. It is highly nutritive, and may be employed for the same purposes with tapioca, sago, &c. The reputation which it enjoyed among the ancients, and still enjoys in the East, of possessing aphrodisiac properties, is wholly without foundation.

SANDARACH. *Sandaraca.* This is a resinous substance obtained from the *Thuya articulata*, a small evergreen tree growing in the North of Africa. It is in small, irregular, roundish oblong grains or tears, of a pale yellow colour sometimes inclining to brown, more or less transparent, dry and brittle, breaking into a powder under the teeth, of a faint agreeable odour increased by warmth, and of a resinous slightly acrid taste. It melts with heat, diffusing a strong balsamic odour, and easily inflames. It is almost entirely soluble in ordinary alcohol, and entirely so in that liquid when anhydrous, and in ether. Heated oil of turpentine also dissolves the greater part of it, but very slowly. According to Unverdorben, it consists of three different resins, varying in their relations to alcohol, ether, and the oil of turpentine. The *sandaracin* of Geise, which remains after sandarach has been exposed to the action of ordinary alcohol, is a mixture of two of these resins. Sandarach was formerly given internally as a medicine, and entered into the composition of various ointments and plasters. At present it is used chiefly as a varnish. It is sometimes employed as incense, and its powder is rubbed upon paper in order to prevent ink from spreading, after letters have been scratched out.

SAPONARIA OFFICINALIS. *Soapwort.* A perennial herbaceous plant, growing wild in this country, in the vicinity of cultivation, but probably introduced from Europe. It is commonly known by the vulgar name of *bouncing bet.* It is one or two feet high, with smooth, lanceolate leaves, and clusters of conspicuous whitish or slightly purplish flowers, which appear in July and August. The root and leaves are employed. They are inodorous, and of a taste at first bitterish and slightly sweetish, afterwards somewhat pungent, continuing long, and leaving a slight sense of numbness on the tongue. They impart to water the property of forming a lather when agitated, like a solution of soap, whence the name of the plant was derived. This property, as well as the medical virtues of the plant, reside in a peculiar extractive matter, obtained from the root by Bucholz, and called by him *saponin.* This principle constitutes, according to Bucholz, 34 per cent. of the dried root, which contains also a considerable quantity of gum and a little bassorin, resin, and altered extractive, besides lignin and water. *Saponin* is obtained, though not absolutely pure, by treating the watery extract with alcohol and evaporating. It is brown, somewhat translucent, hard and brittle, with a sweetish taste, followed by a sense of acrimony in the fauces. It is soluble in water and officinal alcohol, but is insoluble in anhydrous alcohol, ether, and the volatile oils. Its watery solution froths when agitated. Soapwort has been much used in Germany as a remedy in venereal and scrofulous affections, cutaneous eruptions, and visceral obstructions. It appears to act as an alterative, like sarsaparilla, to which it has been deemed superior in efficacy by some physicians. The plant is given in the forms of decoction and extract, which may be freely taken. From two to four pints of the decoction daily are recommended in lues. The inspissated juice, given in the quantity of half an ounce in the course of a day, is said by Andry generally to cure gonorrhœa in about two weeks, without any other remedy.

SARCOCOLLA. A peculiar vegetable product, exuding spontaneously from the *Penæa Sarcocolla*, *P. mucronata*, and other species of Penæa, small shrubs growing at the Cape of Good Hope, in Ethiopia, Arabia, &c. It is in the form of small, roundish, irregular grains, sometimes agglutinated in masses, friable, opaque or semi-transparent, of a yellowish or brownish-red colour, inodorous unless heated, when they have an agreeable smell, and of a peculiar, bitter, sweetish, and acrid taste. Sarcocolla, according to Pelletier, consists of 65.3 per cent. of a peculiar substance, considered by Dr. Thomson as holding an intermediate place between gum and sugar, and called *sarcocollin* or pure sarcocolla, 4.6 of gum, 3.3 of a gelatinous matter having some analogy with bassorin, and 26.8 of lignin, &c. It is said to be purgative, but at the same time to produce serious inconvenience by its acrid properties. The Arabian physicians used it internally; and by the ancients it was employed as an external application to wounds and ulcers, under the idea that it possessed the property of agglutinating the flesh, whence its name was derived. It is at present out of use.

SASSA GUM. This name has been applied by Guibourt to a gum, occasionally brought into market from the East, and answering so exactly to Bruce's description of the product of a tree which he calls *sassa*, that there is reason to believe in their identity. According to Guibourt's description, it is in mammillary masses, or in convoluted pieces resembling an ammonite, of a reddish colour, and somewhat shining surface, and more transparent than tragacanth. Its taste is like that of tragacanth, but slightly acrid. When introduced into water, it becomes white, softens, and swells to four or five times its original bulk; but it preserves its shape, neither like tragacanth forming a mucilage, nor, like Bassora gum, separating into distinct flocculi. It is rendered blue by iodine.

SATUREJA HORTENSIS. *Summer Savory*. An annual labiate plant, growing spontaneously in the South of Europe, and cultivated in gardens as a culinary herb. It has an aromatic odour and taste, analogous to those of thyme, and was formerly used as a gentle carminative stimulant; but it is now employed only to give flavour to food. The *S. montana* or *winter savory*, which is also cultivated in gardens, has similar properties, and is similarly employed.

SCOLOPENDRIUM OFFICINARUM, Smith. *Asplenium Scolopendrium*, Linn. *Harts-tongue*. A fern indigenous in Europe and America. Its vulgar name was derived from the shape of its leaves, which were the part formerly used in medicine. They have a sweetish, mucilaginous, and slightly astringent taste, and, when rubbed, a disagreeable oily odour. They have been used as a deobstruent in visceral affections, as an astringent in hemorrhages and fluxes, and as a demulcent in pectoral complaints; but their properties are feeble, and they have been superseded by more active medicines.

SCUTELLARIA LATERIFLORA. *Scullcap*. This is an indigenous perennial herb, belonging to the Linnæan class and order *Didynamia Gymnospermia*, and to the natural order *Labiatæ*. Its stem is erect, much branched, quadrangular, smooth, and one or two feet high. The leaves are ovate, acute, dentate, subcordate upon the stem, opposite, and supported upon long petioles. The flowers are small, of a pale blue colour, and disposed in long, lateral, leafy racemes. The calyx has an entire margin, which, after the corolla has fallen, is closed with a helmet-shaped lid. The tube of the corolla is elongated, the upper lip concave and entire, the lower three-lobed. The plant grows in moist places, by the sides of ditches and ponds, in all parts of the Union. To the senses it does not indicate, by any peculiar taste or smell, the possession of remarkable medicinal virtues. It is even destitute of the aromatic properties which are found in many of the labiate plants. When taken internally, it produces no obvious effects upon the system. Notwithstanding this apparent inertness, it obtained, at one period, extraordinary credit throughout the United States as a preventive of hydrophobia, and was even thought to be useful in the disease itself. A strong infusion of the plant was given in the dose of a teacupful, repeated several times a day, and continued for three or four months after the bite was received; while the herb itself was applied to the wound. Strong testimony has been adduced in favour of its prophylactic powers; but it has already shared the fate, which in this case is no doubt deserved, of numerous other specifics against hydrophobia, which have been brought into temporary popularity only to be speedily abandoned. The *Scutellaria galericulata* or common *European scullcap*, which also grows wild in this country, has a feeble, somewhat alliaceous odour, and a bitterish taste. It has been employed in intermittents, and externally in old ulcers, but is now out of use. Another indigenous species—the *S. integrifolia*, of which the *S. hyssopifolia*, Linn., is considered by some as a variety, has an intensely bitter taste, and might probably be found useful as a tonic.

SECALE CEREALE. *Rye.* Syria, Armenia, and the southern provinces of Russia, have been severally indicated by different authors as the native country of rye. The plant is now cultivated in all temperate latitudes. The *grains* consist, according to Einhof, of 24.2 per cent. of envelope, 65.6 of flour, and 10.2 of water. The *flour*, according to the same chemist, consists of 61.07 per cent. of starch, 9.48 of gluten, 3.28 of albumen, 3.28 of uncrystallizable sugar, 11.09 of gum, 6.38 of vegetable fibre, besides 5.62 of loss, comprising an acid, the nature of which was not determined. Rye flour is much used, in the dry state, as an external application to erysipelatous inflammation, and other eruptive affections, the burning and unpleasant tingling of which it tends to allay, while it absorbs the irritating secretions. In the form of mush, it is an excellent laxative article of diet; and mixed with molasses, it may be given with great advantage in hemorrhoidal affections and prolapsus ani, connected with constipation.

SEDUM ACRE. *Biting Stone-crop. Small Houseleek.* A small, perennial, succulent European plant, growing on rocks and old walls, with stems about as long as the finger, and numerous very minute leaves. It is without odour, and has a taste which at first is cooling and herbaceous, afterwards burning and durably acrid. Taken internally it vomits and purges, and applied to the skin, produces inflammation and vesication. The fresh herb and the expressed juice have been used as an antiscorbutic, emetic, cathartic, and diuretic, and have been applied locally to old ulcers, warts, and other excrescences; but the plant is at present little employed. It has recently been recommended in Germany as a remedy in epilepsy. Other species of Sedum are less acrid, and are even eaten as salad in some parts of Europe. Such are the *S. rupestre* and *S. album*. The *S. Telephium* was formerly employed externally to cicatrize wounds, and internally as an astringent in dysentery and hæmoptysis; and is still esteemed by the common people in France as a vulnerary.

SEMPERVIVUM TECTORUM. *Common Houseleek.* A perennial succulent European plant, growing on rocks, old walls, and the roofs of houses, and remarkable for its tenacity of life. It is occasionally cultivated in this country as an ornament to the walls of houses, or as a domestic medicine. The leaves, which are the part used, are oblong, pointed, from half an inch to two inches in length, thick, fleshy, succulent, flat on one side, somewhat convex on the other, smooth, of a light green colour, inodorous, and of a cooling, slightly saline, astringent, and sourish taste. They are employed, in the recent state and bruised, as a cooling application to burns, stings of bees, hornets, &c., ulcers, and other external affections attended with inflammation. They contain a large proportion of supermalate of lime.

SENECIO VULGARIS. *Common Groundsel.* An annual European plant, introduced into this country, and growing in cultivated grounds. The whole herb is used, and should be gathered while in flower. It has, when rubbed, a peculiar rather unpleasant odour, and a disagreeable, herbaceous, somewhat bitterish and saline taste, followed by a sense of acrimony. It is emetic in large doses, and has been given in convulsive affections, liver complaints, spitting of blood, &c., but is now very little used. The bruised herb is sometimes applied externally to painful swellings and ulcers. The plant is employed also as food for birds, which are very fond of it. Other species of Senecio have also been medicinally used; and an indigenous species, the *S. aureus* or *ragwort*, is said by Schoepf to be a favourite vulnerary with the Indians.

SIENNA. *Terra di Sienna.* An argillaceous mineral, compact, of a fine texture, very light, smooth and glossy, of a yellowish-brown or coffee colour, leaving a dull orange trace when moistened and drawn over paper. By calcination it assumes a reddish-brown colour, and is then called *burnt sienna*. In both the raw and burnt states it is used for painting. The best sienna is brought from Italy, but an inferior kind is found in England.

SILENE VIRGINICA. *Catch-fly. Wild Pink.* An indigenous perennial plant, growing in Western Virginia and Carolina, and in the states beyond the Alleghany mountains. Dr. Barton, in his "Collections," states that a decoction of the roots is said to be efficacious as an anthelmintic. We are told that it is considered poisonous by some of the Indians. The *S. Pennsylvanica*, which grows in the Eastern section of the Union, from New York to Virginia, probably possesses similar properties.

SISYMBRIUM OFFICINALE, Scopoli. *Erysimum officinale*, Linn. *Hedge Mustard.* A small annual plant, growing both in the United States and Europe, along the road-sides, by walls and hedges, and on heaps of rubbish. It has an herbaceous somewhat acrid taste, which is strongest in the tops and flower-spikes, and resembles that of mustard, though much weaker. The seeds have considerable pungency. The herb is said to be diuretic and expectorant, and has been recommended in chronic coughs, hoarseness, and ulceration of the mouth and fauces. The juice of the plant may be used mixed with honey or sugar, or the seeds may be taken in substance. The *Sisymbrium Sophia* or *flix weed* is also among the plants formerly considered officinal. It is of a pungent odour when rubbed, and of an acrid biting taste. The herb has been used externally in indolent ulcers, and the seeds internally in worms, calculous complaints, &c.

SIUM NODIFLORUM. *Water-parsnip.* A perennial, umbelliferous, aquatic European plant, growing also in the Southern section of the United States, where it is supposed to have been introduced. It is commonly considered poisonous; but the expressed juice, given by Withering in the dose of three or four ounces every morning, was not found to affect the head, stomach, or bowels. He found it, in this quantity, very advantageous in obstinate cutaneous diseases; and the plant has been usefully employed by others in similar complaints, and in scrofulous swellings of the lymphatic glands. It is considered diuretic. The *S. latifolium*, which grows in Europe and the United States, and is the common water-parsnip of this country, is positively asserted to be poisonous; and madness and even death are said to have followed the use of the root. The *S. Sisarum* or *skirret*, a plant of Chinese origin, cultivated in Europe, has a sweetish, somewhat aromatic root, which is employed as food in the form of salad, and is supposed to be a useful diet in complaints of the chest.

SMALT. *Azure.* When the impure oxide of cobalt, obtained by roasting the native arseniuret of that metal, is heated with sand and potassa, the mixture melts, and a beautiful blue glass results, which, when reduced to powder, receives the name of smalt. It is used chiefly in painting.

SOOT. *Fuligo Ligni.* This well known substance has a peculiar smell, and a bitter, empyreumatic, and disagreeable taste. Its composition is very complex. Reduced to powder and treated with water, it affords an infusion of a deep yellow or brown colour, the colour being deeper if heat be employed. The insoluble portion amounts to about forty-four per cent. The soluble part consists chiefly, according to Berzelius, of a pyrogenous resin united with acetic acid, called *acid pyretin*, and saturated with potassa, lime, and magnesia. It also contains sulphate of lime, chloride of potassium, acetate of ammonia, and traces of nitric acid. If the solution be evaporated to dryness, it furnishes a black extract. This forms with water a blackish brown solution, which, when treated with any free acid, except the acetic, lets fall the acid pyretin, in the form of a black mass, resembling pitch; while the acid employed remains in solution with the bases previously in combination with the pyretin. Braconnot thought he had discovered in the pyretin, a peculiar principle, to which he gave the name of *asbolin;* but Berzelius thinks he was mistaken. Besides these substances, Braconnot ascertained the existence in soot of an azotized extractive matter to the amount of twenty per cent. This matter when submitted to dry distillation, afforded a considerable portion of pyrogenous oil. The soot itself, when subjected to a similar distillation, furnished one-fifth of its weight of empyreumatic oil. To the above ingredients of soot, must be added creosote, which was not discovered at the date of the researches of Berzelius and Braconnot, and to the presence of which soot is supposed to owe its medicinal properties.

Soot was formerly officinal with the Edinburgh College, and the Scotch physicians were in the habit of frequently prescribing it as a tonic and antispasmodic in the form of tincture. It went very much out of use in regular practice; and it is only within a few years, that its employment has been revived on account of its containing creosote. At present it is chiefly used as an external remedy in the form of decoction or ointment. In the *Revue Med.* for June 1834, M. Bland details a number of cases of various affections, such as obstinate tetters, porrigo favosa, psora, fistula, cancerous and venereal ulcers, chronic irritations of the lining membrane of the mouth, exudations from the mucous membrane of the nose, herpetic eruptions of the genital organs, and pruritus of the vulva, in which the use of soot effected a cure. The *decoction* is made by adding two handfuls of soot to a pint of water, boiling for half an hour and filtering. It is applied as a lotion to the affected parts; or injected into the fistulæ, several times a day, and, in the intervals, the part, if accessible, is dressed with an *ointment*, made by rubbing up a drachm of finely powdered soot with an ounce of lard. In cases of porrigo, the crusts must be removed by poultices, before the soot is applied. In scrofulous ophthalmia, M. Caron Duvillards, and M. Baudeloque have found a collyrium, made according to the following formula, very useful. Dissolve two ounces of soot in boiling water, filter the solution and evaporate it to dryness. Dissolve the dry residue, with the assistance of heat, in strong white wine vinegar, and add extract of roses in the proportion of twenty-four grains to twelve fluidounces of the liquid. It is prepared for use by adding a few drops of the liquid to a glass of water. (*Bull. Gen. de Therapeutique, Mars* 1834.) This formula is not very satisfactory, as it does not indicate the proportions of water and vinegar to be employed.

We are informed by Dr. Hewson of this city that he found an infusion of soot, an efficacious remedy, employed by injection, in cases of ascarides. In one case, of long standing in an adult, in which a number of remedies had been tried unsuccessfully, injections of soot daily, persevered in for two weeks, effected a complete cure. The injection was made by adding a cupful of soot to a pint of boiling water, and straining the solution. An *infusion of hickory ashes and soot* has formed, for some time past, a popular remedy for dyspepsia. It is made by infusing a pint of clean hickory ashes, and a gill of soot in half a gallon of boiling water, allowing the liquor to stand for twenty-four hours, and then decanting. Of this a small wineglassful is to be taken three or four times a day. No doubt this infusion has been useful in acidity of stomach; but its indiscriminate use in all gastric affections popularly confounded under the name of dyspepsia, is calculated to do much harm.

Soot is employed in the arts as a colouring matter. Meat, which has been allowed to remain from half an hour to an hour in an infusion of one part of soot to six parts of cold water, keeps like smoked meat. From this fact it is evident that soot is a good antiseptic.

SPANISH BROWN. A brownish-red ochre, much used in painting.

SWIETENIA FEBRIFUGA. A large tree growing in the East Indies. The bark is the portion medicinally employed. It is smooth and red internally, rough and gray on the outer surface, of a feeble aromatic odour, and an astringent bitter taste. Water extracts its virtues by infusion or decoction. It is said to have been much used in India as a substitute for Peruvian bark, to which it is somewhat analogous in medical properties, though it contains neither cinchonia nor quinia. The dose of the powder is from thirty grains to half a drachm. The watery extract has the virtues of the bark.

The *Swietenia Mahagoni* or *Mahogany-tree*, which grows in the West Indies and other parts of tropical America, has also a bitter astringent bark, which resembles that of the S. febrifuga in virtues as well as in sensible properties. The wood of this tree is the mahogany so much used in ornamental wood-work.

SYMPHYTUM OFFICINALE. *Comfrey.* A perennial European plant, cultivated in our gardens for medical use. Its root, which is the part used, is spindleshaped, branched, often more than an inch thick and a foot long, externally smooth and blackish, internally white, fleshy, and juicy. By drying, it becomes wrinkled, of a firm horny consistence, and of a dark colour within. It is almost inodorous, and has a mucilaginous, feebly astringent taste. Among its constituents are mucilage, in great abundance, and a small quantity of tannin. It was formerly highly esteemed as a vulnerary, but has lost its credit in this respect. Its virtues are chiefly those of a demulcent, and it may be advantageously used for all the purposes to which the marshmallow is applied. It is a very common ingredient in the domestic cough mixtures employed in chronic catarrhs, consumption, and other pectoral affections. The most convenient form of administration is that of decoction, which may be made either from the fresh or dried root. According to Lewis, comfrey root yields to water a larger proportion of mucilage than the root of the Althæa.

TACAMAHAC. *Tacamahaca.* The resinous substance commonly known by this name, is supposed to be derived from the *Fagara octandra* of Linn. (*Elaphrium tomentosum*, Jacq., *Amyris tomentosum*, Spreng.), a tree of considerable size, growing in the island of Curacoa, and in Venezuela. The juice exudes spontaneously, and hardens on exposure. As brought into the market, it is in irregularly shaped pieces of various sizes, some not larger than a mustard seed, others as much as an inch or two inches in diameter. The colour is usually light yellowish or reddish-brown; but in the larger masses is more or less diversified. The pieces are in general translucent, though frequently covered with powder upon their surface, so as to render them apparently opaque. They are heavier than water, brittle, and pulverizable, yielding a pale yellow powder. Their odour is resinous and agreeable, their taste bitter, balsamic, and somewhat acrid. Exposed to heat they melt and exhale a stronger odour. Tacamahac is partially soluble in alcohol, and completely so in ether and the fixed oils. It consists of resin with a little volatile oil.

Another variety is obtained from the East Indies, and called *tacamahaca orientale*, or *tacamahaca in testis*. It is supposed to be derived from the *Calophyllum Inophyllum;* and comes into the market in gourdshells covered with rush leaves. It is of a pale yellow colour inclining to green, slightly translucent, soft and adhesive, of an agreeable odour, and an aromatic bitterish taste. It is at present very rare in commerce.

Guibourt describes several other varieties of tacamahac, which, however are little known. Among them is a soft, adhesive, dark green resin, said to be procured from the *Calophyllum Tacamahaca* of Willd., a tree growing in the islands of Bourbon and Madagascar.

Tacamahac was formerly highly esteemed as an internal remedy, but is now employed medicinally only in the composition of ointments and plasters, and little even for this purpose. Its properties are analogous to those of the turpentines. It is sometimes used as incense.

TANNIN. *Tannic acid.* Since the publication of the experiments of M. Pelouze, this substance has been universally admitted to rank with the acids, and is consequently denominated, in recent chemical works, *tannic acid.* Its extensive diffusion in vegetables, the wide circle of its affinities, and the consequent influence which it exercises in numerous pharmaceutical operations, both extemporaneous and officinal, are sufficient grounds, independently of its effects as a remedial agent, for giving it a place in this work, though it does not rank among the medicines or preparations directed either in the United States or British Pharmacopœias.

The term *tannin*, like the term sugar, resin, &c. has been considered as applicable not so much to one distinct proximate principle, invariable in its character and composition, as to a set of substances, which, though differing somewhat in their nature, are very closely allied to each other, and possess many properties in common. It has been observed, that tannin, as procured from certain vegetables, affords, with a solution of a persalt of iron, a black precipitate, and colours the liquid deep blue; while, as furnished by others, it gives a grayish-green precipitate with the same solution, and colours the liquid green. Hence has arisen a distinction of this substance into two varieties; 1. *tannin which is rendered black or blue*, and 2. *tannin which is coloured green*, by the persalts of iron. The first, which is the most abundant, is that found in the different species of oak, and consequently in galls; the second exists in Peruvian bark, catechu, and various other vegetable products. It has not yet been determined whether these are really distinct bodies, or whether their difference is not ascribable to the presence of foreign substances in one or both. As they do not materially differ in other respects, and as the tannin procured from galls is that which has attracted most attention, we shall confine our observations to this variety.

Numerous processes for obtaining tannin in a state of purity have been proposed; but most of them are complex, and, in consequence of the readiness with which this principle undergoes alteration, are insufficient for the end in view. The process of M. Pelouze has superseded all others, being preferable both for its facility and the purity of the resulting preparation. An elongated narrow glass vessel, open at both ends, is taken. The lower orifice is loosely closed by a piece of linen or cotton; and above this is placed some very fine powder of galls, which is lightly pressed together, and added till it fills half the capacity of the vessel. Sulphuric ether is then poured upon the powder till it fills the vessel, the upper aperture of which is afterwards closed to prevent the evaporation of the ether. The apparatus is placed in the mouth of a bottle, in which the ether is received as it percolates through the galls. The water always present in the ether of the shops dissolves the tannin, to the exclusion of all the other principles of the galls, and forms a saturated solution, which separates from the ether, and remains as a distinct layer at the bottom of the bottle. When the powder has been exhausted by the addition of successive portions of the solvent, the apparatus is taken apart, the ether is separated from the aqueous solution of tannin beneath it, and the latter, after being washed with some fresh ether, is evaporated by a very gentle heat, or in a vacuum with sulphuric acid. From 35 to 40 per cent. of tannin is thus obtained from galls.

Pure tannin is solid, uncrystallizable, white or very slightly yellowish, inodorous, strongly astringent to the taste without bitterness, very soluble in water, much less soluble in alcohol and ether, especially when anhydrous, and insoluble in the fixed and volatile oils. It may be kept unchanged in the solid state. Exposed to heat, it partly melts, swells up, blackens, takes fire, and burns with a brilliant flame. The aqueous solution, when exposed to the air, gradually becomes turbid, and deposites a crystalline matter, consisting chiefly of gallic acid. During the change, oxygen is absorbed, and an equal volume of carbonic acid disengaged. Tannin has an affinity for acids, and when in solution affords precipitates with the sulphuric, nitric, muriatic, phosphoric, and arsenic acids, but not with the oxalic, tartaric, lactic, acetic, or citric. The precipitates are compounds of tannin with the respective acids, and are soluble in pure water, but insoluble in water with an excess of acid. Hence, in order to ensure precipitation, it is necessary to add the acid in excess to the solution of tannin. This principle also unites with most of the salifiable bases. With potassa it forms a compound but slightly soluble, and is therefore precipitated by this alkali or its carbonates from a solution which is not too dilute, though a certain excess of alkali will cause the precipitate to be redissolved. Its combination with soda is much more soluble; and this alkali affords no precipitate unless with a very concentrated solution of tannin. With ammonia its relations are similar to those with potassa. Baryta, strontia, lime, and magnesia, added in the state of hydrates, form with it compounds of little solubility. The same is the case with most of the metallic oxides, when presented, in the state of salts, to a solution of the tannate of potassa. Many of the metallic salts are precipitated by tannin even in the uncombined state, especially those of lead, copper, silver, uranium, chromium, mercury, and the protosalts of tin. With the persalts of iron it forms a black precipitate, which is a compound of tannin and the peroxide of iron, and is the basis of ink. It does not disturb the solutions of the pure protosalts of iron. Several of the alkaline salts precipitate tannin from its aqueous solution, either by the formation of insoluble compounds, or by simply abstracting the solvent. Tannin unites with all the vegetable alkalies, forming compounds which are for the most part of a whitish colour and but very slightly soluble in water, though they are soluble in the vegetable acids and in alcohol, and in this latter respect differ from most of the compounds which tannin forms with other vegetable principles. It precipitates solutions of starch, albumen, and gluten, and forms with gelatin, an insoluble compound, which is the basis of leather. Its ultimate constituents are carbon, hydrogen, and oxygen.

Medical Properties and Uses. Tannin, being the chief active principle of vegetable astringents, is capable of exerting on the system the same effects with this class of medicines, and may be given in the same complaints. It has an advantage over the astringent extracts in the comparative smallness of its dose, which renders it less apt to offend an irritable stomach. In most of the vegetable astringents, the tannin is associated with more or less bitter extractive, or other principle which modifies its operation, and renders the medicine less applicable than it otherwise would be, to certain cases in which there is an indication for pure astringency without any tonic power. Such is particularly the case with the active hemorrhages; and tannin, in its separate state, is in these cases preferable to the native combinations in which it ordinarily exists. Dr. Porta, an Italian physician, employed it with great success in the treatment of uterine hemorrhage, and published the results of his experience in 1827. M. Cavalier afterwards used it successfully in the same complaint, and found it effectual also in a case of bleeding from the rectum. There is no doubt that it would be found a highly useful remedy in most forms of hemorrhage, after a sufficient reduction of arterial action by depletory measures. In diarrhœa also it would probably be more beneficial than ordinary astringents, as less liable to irritate the stomach and bowels. It was given by Porta in the dose of three grains every three hours.

TEA. The plant which furnishes tea—*Thea Chinensis*—is an evergreen shrub, belonging to the class and order Monadelphia Polyandria of the Sexual system, (Polyandria Monogynia, *Linn.*) and to the natural order Ternströmiaceæ. It is usually from four to eight feet high, though capable, in a favorable situation, of attaining the height of thirty feet. It has numerous alternate branches, furnished with elliptical oblong or lanceolate, pointed leaves, which are serrate except at the base, smooth on both sides, green, shining, marked with one rib and many transverse veins, and supported alternately upon short footstalks. They are two or three inches long, and from half an inch to an inch in breadth. The flowers are either solitary, or supported two or three together at the axils of the leaves. They are of considerable size, not unlike those of the myrtle in appearance, consisting of a short green calyx with five or six lobes, of a corolla with from four to nine large unequal snow-white petals, of numerous stamens with yellow anthers and connected at their base, and of a pistil with a three-parted style. The fruit is a three-celled and three seeded capsule. It has not been certainly determined whether more than one species of the tea-plant exists. Linnæus admitted two species—the *T. Bohea* and the *T. viridis*—differing in the number of their petals; but this ground of distinction is untenable, as the petals are known to vary very much in the same plant. Hayne makes three species—the *T. stricta*, *T. Bohea*, and *T. viridis*, which are distinguished severally by the shape of their leaves and fruit, and the direction of the footstalk. Botanists, however, at present, generally agree with De Candolle in admitting but one species, with two varieties—the *viridis* or green tea, with "lanceolate flat leaves, three times as long as they are broad," and the *Bohea*, with elliptical oblong, subrugose leaves, twice as long as broad."

The tea-plant is a native of China and Japan, and is cultivated in both countries, but most abundantly in the former. In Japan it forms hedge rows around the rice and corn-fields; in China, whence immense quantities of tea are exported, whole fields are devoted to its culture. It is propagated from the seeds, which are planted in holes at certain distances apart, six or eight seeds being placed in each hole, in order to ensure the growth of one. In three years the plant yields leaves for collection, and in six years attains the height of a man. When from seven to ten years old, it is cut down, in order that the numerous shoots which issue from the stump may afford a large product of leaves. These are picked separately by the hand. Three harvests, according to Kœmpfer, are usually made during the year, the first at the end of February, the second at the beginning of April, and the third in June. As the youngest leaves are the best, the product of the first collection is most valuable, while that of the third, consisting of the oldest leaves, is comparatively little esteemed. Sometimes only one or two harvests are made; but care is always taken to assort the leaves according to their age; and thus originate numerous commercial varieties of tea. The character of the plant, dependent upon the soil, situation, climate, and culture, has also great influence upon the value of the leaves. It is said that the best tea is procured from the shrubs which grow upon the sides of steep hills with a southern exposure. Though the plant grows both about Pekin in the North, and Canton in the South of China, it is said to attain greater perfection in the intermediate country, in the neighbourhood of Nankin for instance, where the climate is neither so cold as in the first mentioned vicinity, nor so hot as in the second. Some of the commercial varieties have their origin in this cause; and it is not impossible, though the fact has not been ascertained, that difference in species may be another source of diversity in the product. After having been gathered, the leaves are dried by artificial heat in shallow iron pans, from which they are removed while still hot, and rolled with the fingers, or in the palm of the hand, so as to be brought into the form in which they are found in commerce. It is stated that the odour of the tea leaves themselves is very slight; and that it is customary to mix with them the leaves of certain aromatic plants, such as the *Olea fragrans* and *Camellia Sasanqua*, in order to render them pleasant to the smell. It is obvious that the nature of the addition will affect to a certain extent the quality of the tea, and thus still further increase the diversity arising from the age of the leaf and the character of the plant.

Tea is brought to this country from the port of Canton. Numerous varieties exist in commerce, differing in the shape communicated by rolling, in colour, in flavour, or in strength; but they may all be arranged in the two divisions of *green* and *black teas*, which, at least in their extremes, differ so much in properties, that it is difficult to conceive that they are derived from the same species.

Properties. Green tea is characterized by a dark-green colour, sometimes inclining more or less to blue or brown. It has a peculiar, refreshing, somewhat aromatic odour, and an astringent, slightly pungent, and agreeably bitterish taste. Its infusion has a pale greenish-yellow colour, with the odour and taste of the leaves. Green tea, according to Cadet de Gassicourt, contains gallic acid, tannin, and bitter extractive. One hundred parts of it yielded to Frank, 34.6 parts of tannin, 5.9 of gum, 5.7 of gluten, and 51.3 of lignin, with 2.5 of volatile matters including loss. But the tannin of Frank includes all the substances taken by alcohol from the watery extract, and consequently contains all the extractive matter existing in tea. Davy found only 8.5 per cent. of tannin. The volatile principle, which is probably essential oil, is the most important ingredient, as it is to this that tea owes its peculiarly agreeable flavour, and probably the effects which it produces upon the nervous system. This principle, however, has not been so far isolated as to admit of an examination of its precise nature. Frank found that tea, when distilled with water, lost all its odour, and that the product exhibited traces of volatile oil. There can be no doubt that the proportion of the ingredients of green tea is somewhat different in the different varieties.

Black tea is distinguished by a dark brown colour. It is usually less firmly rolled, and lighter than the green, and contains the petioles of the plant mingled with the leaves. Its odour is fainter and of a somewhat different character, though still fragrant. Its taste, like that of the green tea, is astringent and bitterish: but it is less pungent, and to most persons less agreeable. To hot water it imparts a brown colour, with its sensible properties of taste and smell. These vary exceedingly in strength in the different varieties; and some black teas are almost wholly destitute of aromatic or agreeable flavour. The constituents of black tea are of the same general character with those of the green. Frank found in 100 parts, 40.6 of tannin, 6.3 of gum, 6.3 of gluten, 44.8 of lignin, with 2.0 parts of volatile matter including loss. As in his analysis of green tea, the proportion of tannin is too largely stated. Davy found in Souchong tea, which is a variety of the black, only ten per cent. of tannin. There can be little doubt that black tea contains less volatile oil than green. The proportion of tannin would appear from the experiments of Frank and Davy to be greater; but the contrary is stated to have been the result of an examination by Brande of several varieties of each kind.

A crystallizable principle has been discovered in tea by Oudry, for which he proposes the name of *thëin.* To obtain it he infused 12½ parts of tea in 200 parts of cold water containing 3 parts of common salt. At the end of twenty-four hours he evaporated the infusion to dryness, treated the residue with alcohol of 0.81, again evaporated, dissolved the alcoholic extract in water, and digested the solution with pure magnesia. The solution filtered and concentrated, let fall crystals of *thëin.* This principle is colourless, soluble in water and alcohol, fusible, and, according to Oudry, capable of forming crystallizable compounds with sulphuric and citric acids, though it exhibits no alkaline reaction. Berzelius observes that these statements need confirmation. (*Berzelius, Traité de Chim.*)

Medical Properties and Uses. Tea is astringent and gently excitant, and in its finer varieties exerts a decided influence over the nervous system, evinced by the feelings of comfort and even exhilaration which it produces, and the unnatural wakefulness to which it gives rise when taken in unusual quantities, or by those unaccustomed to its use. Its properties, however, are not of so decided a character as to render it capable of very extensive application as a medicine; and its almost exclusive use, as every one knows, is as a grateful beverage at the evening and morning meal. Taken moderately, and by healthy individuals, it may be considered as perfectly harmless; but long continued in excessive quantity, it is capable of inducing unpleasant nervous and dyspeptic symptoms, the necessary consequences of over excitement of the brain and stomach. Green tea is decidedly more injurious in these respects than black, and should be avoided by dyspeptic individuals, and by those whose nervous systems are peculiarly excitable. As a medicine, tea may sometimes be given advantageously in diarrhœa; and a strong infusion will often be found to relieve nervous headach. For the latter purpose green tea should be preferred. The mode of preparing tea for use is too well known to require description. An extract is made from it in China, which is said to be useful in fevers.

TEUCRIUM CHAMÆDRYS. *Germander. Chamædrys.* A small, didynamous, labiate, perennial, European plant, the leaves and tops of which have an agreeable aromatic odour, diminished by drying, and a bitter, somewhat astringent, aromatic, durable taste. They have been employed as a mild corroborant, in uterine, rheumatic, gouty, and scrofulous affections, and intermittent fevers; but are at present little used, and never in this country. Germander was an ingredient in the *Portland powder*, noted as a remedy in gout. This powder, according to the original prescription, consisted of equal parts of the roots of the *Aristolochia rotunda* and *Gentiana lutea*, of the tops and leaves of the *Teucrium Chamædrys* and *Erythræa Centaurium*, and of the leaves of the *Ajuga Chamæpytis* or *ground pine*. The dose was a drachm taken every morning before breakfast, and continued for three months, then two scruples for three months, afterwards half a drachm for six months, and finally half a drachm every other day for a year. (*Farr.*)

Two other species of Teucrium have been used in medicine—the *T. Marum*, *cat thyme*, or *Syrian herb mastich*, which is a native of the South of Europe, and the *T. Scordium*, or *water germander*, which grows in the higher latitudes of the same continent. The former is a warm, stimulating, aromatic bitter, and has been highly recommended in hysteria, amenorrhœa, and cases of nervous debility; the latter has the odour of garlic, and a bitter somewhat pungent taste, and was formerly highly esteemed as a corroborant in low forms of disease; but neither of them is now much employed. The *T. Marum* is errhine, and was formerly an ingredient in the *Pulvis Asari Compositus*. The dose of either of the three species of Teucrium is about half a drachm.

THUJA OCCIDENTALIS. *Arbor Vitæ.* A small indigenous evergreen tree, growing wild from Canada to Carolina, and cultivated for ornament in gardens. The leaves, or small twigs invested with the leaves, are the part used. They have an agreeable balsamic odour, especially when rubbed, and a strong balsamic, camphorous, bitter taste. In the state of decoction, they have been used in intermittent fever, and according to Schoepf, in coughs, fevers, scurvy, and rheumatism. Made into an ointment with lard or other animal fat, they are said to form a useful local application in rheumatic complaints. The distilled water is praised by Boerhaave as a remedy in dropsy. (*Schoepf.*) A yellowish-green volatile oil, which may be obtained from the leaves by distillation, has been used with success in worms.

THYMUS VULGARIS. *Thyme.* A small well known undershrub, indigenous in the South of Europe, and with us cultivated in gardens. The herbaceous portion, which should be gathered when the plant is in flower, has a peculiar, strong, aromatic, agreeable odour, which is not lost by drying, and a pungent, aromatic, camphorous taste. Its active constituent is a volatile oil, which may be separated by distillation. Oil of thyme (*oleum thymi*) is, when fresh, of a pale yellow or greenish colour, but as found in the shops is often brown. Its sp. gr. is 0.905. The plant has the aromatic properties of sage, lavender, &c., and may be used for the same purposes. It is, however, more employed in cookery than in medicine. The *T. Serpillum*, or *wild thyme* of Europe, is analogous in properties to the garden thyme. Both are occasionally used in baths, fomentations, and poultices, along with other aromatic herbs.

TONKA BEAN. The seed of the *Dipterix odorata* of Willd., the *Coumarouna odorata* of Aublet, a large tree growing in Guiana. The fruit is an oblong-ovate pod, enclosing a single seed, from an inch to an inch and a half long, from two to four lines broad, usually somewhat compressed, with a dark-brown, wrinkled, shining, thin and brittle skin, and a light-brown, oily kernel. The bean has a strong, agreeable, aromatic odour, and a bitterish, aromatic taste. Its active constituent is a crystallizable, odorous substance, analogous to the volatile oils and camphor, and called *coumarin* by Guibourt. This substance is sometimes found in a crystalline state, between the two lobes of the kernel. The tonka bean is used to flavour snuff, being either mixed with it in the state of powder, or put entire into the snuff-box.

TRIGONELLA FŒNUMGRÆCUM. *Fenugreek.* An annual plant, growing spontaneously in different parts of the South of Europe, and cultivated in France and Germany for the sake of its seeds. These are one or two lines in length, oblong cylindrical, somewhat compressed, obliquely truncated at each extremity, brownish-yellow externally, yellow internally, and marked with an oblique furrow running half their length. They have a strong peculiar odour, and an oily, bitterish, farinaceous taste, and contain fixed and volatile oil, mucilage, bitter extractive, and a yellow colouring substance. An ounce of the seeds boiled in a pint of water renders it thick and slimy. They give out the whole of their distinguishing odour and taste to alcohol. Their virtues depend chiefly upon their oil and mucilage. On the continent of Europe they are employed in the preparation of emollient cataplasms and enemata, and enter into the composition of some officinal ointments and plasters. They are never used internally.

TRIPOLI. *Terra Tripolitana.* An earthy mineral, of a whitish, yellowish, or pale straw colour, sometimes inclining to red or brown, usually friable, often adhesive to the tongue, and presenting the aspect of argillaceous earth, though differing from clay by the roughness and hardness of its particles, and by not forming a paste with water. The *Venice tripoli* is said to come from the island of Corfu. Tripoli is sometimes artificially prepared by calcining certain argillites. It is used for cleaning and polishing metals.

TRITICUM REPENS. *Couch-grass. Dog-grass. Quickens.* A perennial European plant, very common in gardens and cultivated grounds, where it is considered a troublesome weed. The root, which is the part medically used, is horizontal, creeping, jointed, about as thick as a straw or thicker, inodorous, and of an agreeable, sweetish, slightly pungent taste. It is used in some parts of Europe, in the form of decoction, as a slightly aperient and nutritive drink. Great quantities of it are said to be consumed in the hospitals of Paris. The decoction, in consequence of the sugar which it contains, is susceptible of the vinous fermentation.

UMBER. *Terra Umbria.* A mineral, of a fine compact texture, light, dry to the touch, shining when rubbed by the nail, and of a fine pale brown colour, which changes to a peculiar beautiful deep brown by heat. According to Klaproth, it contains 13 parts of silica, 5 of alumina, 48 of oxide of iron, 20 of manganese, and 14 of water in 100. *Burnt umber,* as well as the mineral in its unaltered state, is used in painting. The umber of commerce is said to be brought chiefly from the island of Cyprus.

URTICA DIOICA. *Common nettle.* A well known perennial herbaceous plant, growing both in Europe and the United States, by the roadsides, in hedges, and gardens. The leaves, seeds, and roots, were formerly officinal. They were deemed diuretic and astringent, and were employed in nephritic complaints, hemorrhages, consumption, jaundice, worms, &c. The young shoots are boiled and eaten by the common people as a remedy in scurvy; and the fresh plant is sometimes used to excite external irritation in cases of torpor and local palsy, the part being beaten with it till the requisite degree of action is produced. The *U. urens* or *dwarf nettle*, which is an annual plant, and smaller than the former species, has similar properties, and is used for the same purposes. This species also grows wild both in America and Europe. The two plants were formerly distinguished by the names of *urtica major*, applied to the *U. dioica*, and of *urtica minor*, applied to the *U. urens.*

VANILLA. This is the fruit of the *Vanilla aromatica* of Schwartz, the *Epidendrum Vanilla* of Linn., a climbing plant, growing in the West Indies, Mexico, and South America. The pods are collected before they are quite ripe, dried in the shade, covered over with a coat of fixed oil, and then tied in bundles, which are surrounded with sheet lead, or enclosed in small metallic boxes, and sent into the market. Several varieties of vanilla exist in commerce. The most valuable, called *ley* by the Spaniards, consists of cylindrical, somewhat flattened pods, six or eight inches long, three or four lines thick, nearly straight; narrowing towards the extremities, bent at the base, shining and dark-brown externally, wrinkled longitudinally, soft and flexible, and containing within its tough shell, a soft, black pulp, in which numerous minute, black, glossy seeds are embedded. It has a peculiar, strong, agreeable odour, bearing some resemblance to that of balsam of Peru, and a warm, aromatic, sweetish taste. The interior pulpy portion is most aromatic. Another variety, called *simarona* by the Spaniards, is smaller, of a lighter colour, and less aromatic. A third variety is the *pomprona* of the Spaniards. In this, the pods are from five to seven inches long, from six to nine lines broad, almost always open, brown, soft, viscid, and of a strong odour, but less pleasant than that of the *ley*, to which it is considered inferior. According to Bucholz, vanilla does not yield volatile oil when distilled with water. It is employed to flavour chololate, ice-cream, &c., and as a perfume.

VENETIAN RED. *Bolus Veneta.* A dull-red ochrey substance used in painting.

VERBENA OFFICINALIS. *Vervain.* This is a common European weed, growing on the roadsides, in the vicinity of towns and villages. Its sensible properties do not indicate the possession of medical virtues; as it is nearly inodorous, and has only a slightly astringent bitterish taste. By the ancients it was highly esteemed both as a remedy in disease, and as a sacred plant employed in the performance of religious rites. In modern times, superstitious notions in relation to its virtues are still entertained; and the suspension of the root around the neck by a white ribband, has been gravely recommended for the cure of scrofula. The leaves, bruised, and applied in the form of a cataplasm, are used by the vulgar as a remedy in severe headach, and other local pains. The plant, however, is probably inert. An American species, the *V. hastata*, is more bitter than the European, and is said to be emetic. It is not, however, used in regular medical practice. Schoepf states that the root of the *V. urticifolia*, another indigenous species, has been advantageously used in cases of poisoning from the Rhus Toxicodendron. It is prepared by boiling it in milk and water along with the inner bark of the white oak.

VERDITER. Two preparations of copper, employed as pigments, are known by this name in commerce, and are distinguished by the epithets of blue and green. *Blue verditer* is prepared in London from the solution of nitrate of copper, obtained in precipitating silver by copper. According to Gray, this solution is poured hot upon whiting (carbonate of lime), and the mixture stirred every day till the liquor loses its colour, when it is decanted, and fresh portions added till the proper colour is obtained. By a process for procuring this pigment, invented by Pelletier, the solution of nitrate of copper is decomposed by quicklime, and the precipitate, after being washed, is incorporated intimately with another portion of quicklime. By the former process, a carbonate of copper is obtained, by the latter a mixture of the hydrated oxide of copper and hydrate of lime. *Green verditer* is prepared by precipitating a solution of nitrate of copper by chalk or a white marl, and consists of carbonate of copper mixed with an excess of the calcareous carbonate.

VISCUM ALBUM. *Misletoe.* A European evergreen parasitic shrub, growing on various trees, particularly the apple and other fruit trees, and forming a pendent bush from two to five feet in diameter. The plant is famous in the history of druidical superstition. In the religious rites of the druids, the misletoe of the oak was employed, and hence was afterwards preferred when the plant came to be used as a remedy; but it is in fact identical in all respects with those which grow upon other trees. The fresh bark and leaves have a peculiar disagreeable odour, and a nauseous, sweetish, slightly bitter taste. The berries, which are white, and of about the size of a pea, abound in a peculiar viscid principle, and are sometimes used in the preparation of birdlime, of which this principle is the basis. At one time the misletoe was highly esteemed as a remedy in epilepsy, palsy, and other nervous diseases; but it is now out of use. The leaves and wood were given in the dose of a drachm in substance, and of an ounce in decoction. Several species of Viscum grow in the United States, but are not used.

WHITING. This is essentially the same with the prepared carbonate of lime (prepared chalk) of the Pharmacopœias, being made by the pulverization and elutriation of crude chalk. It is used as a coarse paint, and for various purposes in the arts, for which carbonate of lime is requisite. *Paris white* is a variety of the same material.

ZEA MAYS. *Indian Corn.* Common Indian corn contains, according to the late Dr. Gorham, of Boston, 77 per cent. of starch, 3 of a principle analogous to gluten, called *zein*, 2.5 of albumen, 1.45 of sugar, 0.8 of extractive, 1.75 of gum, 1.5 of sulphate and phosphate of lime, 3 of lignin, and 9 of water. The meal, in the form of mush, makes an excellent emollient poultice, much used in hospitals; and a gruel may be prepared from it which is sometimes more grateful to the sick than that made from oat-meal.

ZEDOARY. *Radix Zedoariæ.* There are two kinds of zedoary, the long and the round, distinguished by the officinal titles of *radix zedoariæ longæ*, and *radix zedoariæ rotundæ*, the former produced by the *Curcuma Zedoaria* of Roxburgh, the latter, as some suppose, by the *Kæmpferia rotunda* of Linn.; but according to others, by the *Curcuma Zerumbet* of Roxburgh. Both kinds come from the East Indies. The *long zedoary* is in slices from an inch and a half to three inches in length, and from half an inch to an inch thick, obtuse at the extremities, and exhibiting the remains of the radical fibres; the *round* is also usually in slices, which are the sections of a roundish root, ending in a point beneath, and divided longitudinally into two parts, each of which is flat on one side, convex on the other, and heart-shaped in its outline. Sometimes the root of the latter variety is entire, and sometimes in quarters instead of halves. It is marked with circular rings on the convex surface, and, like the former, with small projecting points which are the remains of radical fibres. Both are grayish-white on the outside, yellowish-brown within, hard, compact, of an agreeable, aromatic odour, and a bitterish, pungent, camphorous taste. The round, however, is less spicy than the long. They yield a volatile oil when distilled with water.

Zedoary is a warm, stimulating aromatic, useful in flatulent colic and debilitated states of the digestive organs. It is not now employed, as it produces no effects which cannot be as well or better obtained from ginger. The dose is from ten grains to half a drachm.

ZERUMBET. *Cassumuniar.* Under these names an East India root was formerly used, having some analogy in sensible and medical properties to ginger, and ascribed to the *Zingiber Zerumbet* of Roscoe. Some consider the cassumuniar as a distinct root, and refer it to the *Zingiber Cassumuniar* of Roxburgh. The difference of opinion is of little importance, as neither of the roots, supposing them not to be the same, is at present to be found in the markets. By some authors the zerumbet has been erroneously confounded with the round zedoary. Geiger describes it as in pieces of the size of a fig or larger, externally grayish-brown and wrinkled, internally yellowish, hard, and tough, of a biting aromatic taste, and a spicy odour.

ZIZYPHUS VULGARIS, Lamarck. *Rhamnus Zizyphus*, Linn. A shrub, or small tree, growing in the countries bordering on the Mediterranean, and cultivated in Italy, Spain, and the South of France. The fruit is the part used. This consists of oval drupes, of the size of a large olive, with a thin, coriaceous, red or reddish-brown skin, a yellowish, sweet, acidulous pulp, and an oblong pointed stone in the centre. These have the officinal name of *jujubæ*. By drying, their pulp becomes softer and sweeter, and acquires a vinous taste, evincing the commencement of fermentation. They are nutritive and demulcent, and are used in the form of decoction in pectoral complaints. *Jujube paste* consists, properly, of gum Arabic and sugar, dissolved in a decoction of this fruit, and evaporated to the proper consistence. As a demulcent, it is in no respect superior to a paste made with gum Arabic and sugar alone, and the preparation commonly sold in this country under the name, contains in fact none of the fruit.

The fruits of two other species of Zizyphus, the *Z. Lotus*, growing in the North of Africa, and the *Z. Jujuba*, a native of the East Indies, possess properties similar to those of the first mentioned species, and are used as food by the inhabitants of the countries where they grow.

NOTE.—Of the articles included in the foregoing list, those upon *Acetic Ether, Bromine, Cheltenham Salt, Chloride of Lime, Chloride of Potassa, Chloride of Soda, Chlorine Ethers, Creosote, Cyanuret of Potassium, Cyanuret of Zinc, Dippel's Animal Oil, Ferrocyanate of Potassa, Gold, Iodide of Ammonium, Iodide of Iron, Iodide of Sulphur, Iodide of Zinc, Iodo-hydrargyrate of Potassium, Muriatic Ether, Artificial Musk, Nitrate of Soda, Oxalic Acid, Phosphorus,* and *Soot* were written by Dr. Bache; the remainder by Dr. Wood.

[illegible] Dispensatory

II. ART OF PRESCRIBING MEDICINES.

The physician should be acquainted not only with the properties of medicines, and the diseases to which they are respectively applicable, but also with the art of prescribing them, so that they may be adapted to the peculiarities of individual patients, and, by the mode in which they are administered, may produce the greatest curative effect with the least possible inconvenience. In relation to these points, a few general rules will be useful for the guidance of the young practitioner, although much must be left to his own judgment and discretion. We shall compress the remarks which we have to offer, under the two heads of the quantity or dose in which medicines may be given, and the mode of their exhibition.

1. Dose of Medicines.—In the body of the work, the quantity has been stated in which each medicine must ordinarily be given to produce its peculiar effects in the adult patient. But there are various circumstances which modify the dose, and demand attention on the part of the practitioner.

The *age* of the patient is the most important of these circumstances. The young require a smaller dose than those at maturity, to produce an equal effect; and the old, though their systems are, perhaps, less susceptible to the action of medicines than those of the middle-aged, cannot bear an equally forcible impression. The following table of Gaubius, exhibiting the doses proportioned to the age, is frequently referred to.

The dose for a person of middle age being	1	or	1 drachm,
That of a person from 14 to 21 years will be	$\frac{2}{3}$	or	2 scruples,
7 to 14 " "	$\frac{1}{2}$	or	$\frac{1}{2}$ a drachm,
4 to 7 " "	$\frac{1}{3}$	or	1 scruple,
of 4 years "	$\frac{1}{4}$	or	15 grains,
3 " "	$\frac{1}{6}$	or	10 grains,
2 " "	$\frac{1}{8}$	or	8 grains,
1 " "	$\frac{1}{12}$	or	5 grains.

We prefer the following simple scheme of Dr. Young, which we extract from Paris's Pharmacologia.

"For children under twelve years, the doses of most medicines must be diminished in the proportion of the age to the age increased by 12; thus at two years to $\frac{1}{7}$—viz. $\frac{2}{2+12}=\frac{1}{7}$. At twenty-one the full dose may be given."

To the above rule some exceptions are offered in particular medicines, which require to be given to children in much larger proportional doses than those above stated. Such are castor oil and calomel, a certain quantity of which will in general not produce a greater effect in a child two or three years old than double the quantity in an adult.

Sex, temperament, and *idiosyncrasy* have also an influence upon the dose, and should be kept in view in prescribing. Females usually require somewhat smaller doses than males, and those of sanguine temperament than the phlegmatic. Constitutional peculiarities, called idiosyncrasies, often exist in individuals, rendering them more than usually susceptible or insusceptible to the action of certain remedies, the dose of which must be modified accordingly. Thus in some persons a grain or two of calomel will excite salivation, while in others scarcely any quantity which can be safely administered will produce this effect. Sometimes, moreover, a medicine operates on an individual in a manner wholly different from its ordinary mode. In all such cases experience is the only sure guide; but the occasional existence of these peculiarities indicates the propriety of making particular inquiries in relation to the idiosyncrasies of those patients, for whom we may be called for the first time to prescribe.

Habit is another important circumstance which modifies the dose of medicines. Generally speaking, the susceptibility to the action of medicines is diminished by their frequent and continued use; and in order to maintain a given impression, the quantity must be regularly increased. This is especially true in regard to the narcotics, which are sometimes borne in enormous doses by those habituated to their use. It is a good practical rule in prescribing, when circumstances demand the continuance, for a considerable length of time, of some particular effect, to vary the medicine, and employ successively several of the same general powers, so as not too rapidly to exhaust the susceptibility to the action of any individual remedy. Another important practical rule connected with the influence of habit, is, when any medicine, which from its nature is of variable strength, has been employed for some time in increasing doses, to reduce the dose upon resorting to a new parcel, until its relative strength has been ascertained. A neglect of this precaution, in cases where the last parcel happened to be more powerful than that previously employed, has sometimes been followed by very serious consequences.

2. MODE OF ADMINISTERING MEDICINES.—This has reference both to the combination of medicines with one another, and the form in which they are exhibited.

Simplicity in prescription is always desirable when no object is to be gained by deviating from it. Remedies should never be mixed together without a definite purpose, nor with the vague hope that out of the number prescribed some one may perchance produce a salutary impression. Those exceedingly complex prescriptions, formerly so much in vogue, of which the ingredients were so numerous as to render altogether impossible a reasonable estimate of their bearing on each other, or their effects on disease, have been generally abandoned by modern practitioners. The only ground upon which any of them can be justifiably retained, is, that by very frequent trials, through a long course of years, and in various states of disease, their influence on the system may have been fully ascertained, so that they may be considered rather in the light of a single remedy than a compound of many. Upon this ground, however, no prudent physician would attempt to originate such combinations. In mixing medicines, he would proceed no further than he would be justified in doing by a clear knowledge of the properties and mutual relations of the several ingredients, and their fitness to answer some decided indication in the treatment of disease. There are certain principles upon which medicines may be advantageously combined, and which it may not be amiss to mention for the benefit of the young practitioner.

Remedies of the same general character may be given in connexion, in order to increase their energy, or to render their action more certain. It has been well ascertained, that substances thus combined will often act vigorously, when severally they would produce comparatively little effect; and it sometimes happens, that while their activity is augmented, they are at the same time rendered less irritating, as in the case of the drastic cathartics. (See *Pilulæ Catharticæ Compositæ.*)

Different medicines are very often mixed together, in order to meet different and coexisting indications, without any reference to the influence which they may reciprocally exert on each other. Thus in the same patient we not unfrequently meet with debility of stomach and constipation of the bowels, connected with derangement of the hepatic function. To answer the indications presented by these morbid conditions, we may properly combine in the same dose, a tonic, cathartic, and mercurial alterative. For similar reasons we often unite tonics. purgatives, and emmenagogues, anodynes and diaphoretics, emetics and cathartics, antacids, astringents, and tonics; and scarcely two medicines can be mentioned, not absolutely incompatible with each other, which may not occasionally be combined with advantage to counteract coexisting morbid actions.

Another very important object of combination, is the modification which is thereby effected in the actions of medicines differing from each other in properties. In this way new powers are sometimes developed, and those previously existing are greatly increased. Examples of such a result are afforded in the officinal powder of ipecacuanha and opium, and in the combination of squill and calomel; the former operating as a diaphoretic, the latter as a diuretic, beyond the capabilities of either of their constituents. The effects of one medicine are, in numerous instances, increased by the influence of another in augmenting the natural susceptibility of the system to its action. Thus bitters enable cathartics to operate in smaller doses; purgatives awaken the dormant susceptibility to the action of mercury; and stimulants excite the torpid stomach, so that it will receive impressions from various medicines before inoperative. In some instances, the action of one medicine is promoted by that of another apparently of a nature wholly opposite. Thus, when calomel and opium are given in colic, the purgative operation of the former is facilitated by the relaxation of intestinal spasm produced by the latter. Medicines, in addition to the effects for which they are administered, very frequently produce disagreeable symptoms, which may be moderated or altogether prevented by combination with other medicines; and this object may usually be accomplished, without in the least degree interfering with the remediate influence desired. Thus the griping produced by cathartics, and the nausea by these and various other medicines, may often be corrected by the stimultaneous use of aromatics. To cover the disagreeable taste or odour of certain medicines, and to afford a convenient vehicle for their administration, are also important objects of combination; as upon these circumstances often depend the acceptability of the medicine to the stomach, and even the possibility of inducing the patient to swallow it. Substances should be preferred as vehicles which are calculated to render the medicine acceptable to the palate and stomach, and in other ways to correct its disagreeable effects; as syrups for powders, the aromatic waters for medicines given in the form of mixture, and carbonic acid water for the neutral salts.

But in the mixing of medicines, care should be taken that they are neither chemically nor physiologically incompatible; in other words, that they are not such as will react on each other so as to produce new and unexpected combinations, nor such as will exert contrary and opposing effects upon the system. Thus when the operation of an acid is desired, an alkali should not be given at the same time, as they unite to form a third substance entirely different from either; nor should a soluble salt of lime, baryta, or lead, be given with sulphuric acid or a soluble sulphate, as decomposition would ensue, with the production of an inert compound. So also, in relation to physiological incompatibility, diaphoretics and diuretics should not, as a general rule, be united with a view to their respective effects; as these are to a certain extent incompatible, one being diminished by whatever has a tendency to increase the other. There are cases however, in which we may advantageously combine medicines with a view to their chemical reaction, as in the instance of the effervescing draught; and circumstances sometimes call for the union of remedies apparently opposite, as in the case of colic before alluded to, in which opium may be advantageously combined with purgatives. Still, such combinations should never be formed, unless with a full understanding of their effects, and a special reference to them.

The *form in which medicines are exhibited*, is often an object of considerable importance. By variation, in this respect, according to the nature of the medicine, the taste of the patient, or the condition of the stomach, we are frequently enabled to secure the favourable operation of remedies, which without such attention might prove useless or injurious. Medicines may be given in the solid state, as in the form of powder, pill, troche, or electuary; in the state of mixture, in which a solid is suspended in a liquid, or one liquid is mechanically mixed with another in which it is insoluble; or in the state of solution, under which may be included the various forms of infusion, decoction, tincture, wine, vinegar, syrup, honey, and oxymel. Of these different forms we have already treated sufficiently at large, under their respective heads, in the second part of this work.

In writing extemporaneous prescriptions, neatness, order, and precision, should always be observed; as, independently of the pleasing moral effect inseparable from these principles in all things, a positive practical advantage results, in the greater accuracy which the habit of attending to them gives to the prescriber, and the comparative certainty which they afford that his directions will be strictly complied with. As a general rule, when medicines are combined in prescription, that should come first in order which is considered as the most prominent and important, next the adjuvant or corrigent, and lastly the vehicle. Sometimes, however, it is important to indicate to the apothecary the succession in which the substances should be combined in reference to the perfection of the mixture, and this may render convenient a deviation from the order above mentioned. The physician should always be careful either to write out the full name of the medicine, or to employ such abbreviations as are not likely, by the misunderstanding of an ill-formed letter, to lead into error. Very serious and even fatal mistakes have been occasioned by a neglect of this precaution. The formulæ of the several Pharmacopœias which are detailed in this work, will serve as good examples for the guidance of the young practitioner. The following table explains the signs and abbreviations habitually used in prescription. The formulæ afterwards given will serve to illustrate the ordinary mode of prescribing, while they exhibit combinations of medicines frequently employed in practice. W.

Table of Signs and Abbreviations.

℞	Recipe.	Take.
āā	Ana.	Of each.
℔	Libra vel libræ.	A pound or pounds.
℥	Uncia vel unciæ.	An ounce or ounces.
ʒ	Drachma vel drachmæ.	A drachm or drachms.
℈	Scrupulus vel scrupuli.	A scruple or scruples.
O	Octarius vel octarii.	A pint or pints.
f℥	Fluiduncia vel fluidunciæ	A fluidounce or fluidounces.
fʒ	Fluidrachma vel fluidrachmæ.	A fluidrachm or fluidrachms.
♏	Minimum vel minima.	A minim or minims.
Chart.	Chartula vel Chartulæ.	A small paper or papers.
Coch.	Cochlear vel cochlearia.	A spoonful or spoonfuls.
Collyr.	Collyrium.	An eye-water.
Cong.	Congius vel Congii.	A gallon or gallons.
Decoct.	Decoctum.	A decoction.
Ft.	Fiat.	Make.
Garg.	Gargarysma.	A gargle.
Gr.	Granum vel Grana.	A grain or grains.
Gtt.	Gutta vel guttæ.	A drop or drops.
Haust.	Haustus.	A draught.
Infus.	Infusum.	An infusion.
M.	Misce.	Mix.
Mass.	Massa.	A mass.
Mist.	Mistura.	A mixture.
Pil.	Pilula vel pilulæ.	A pill or pills.
Pulv.	Pulvis vel pulveres.	A powder or powders.
Q. S.	Quantum sufficit.	A sufficient quantity.
S.	Signa.	Write.
Ss.	Semis.	A half.

Examples of Common Extemporaneous Prescriptions.

POWDERS.

℞ Antimonii et Potassæ Tartratis gr. i.
Pulveris Ipecacuanhæ ℈i.
Fiat pulvis.

S. To be taken in a wineglassful of sweetened water.

An active emetic.

℞ Hydrargyri Chloridi Mitis.
Pulveris Jalapæ āā gr. x.
Misce.

S. To be taken in syrup or molasses.

An excellent cathartic in the commencement of bilious fevers, and in hepatic congestion.

℞ Pulveris Jalapæ gr. x.
Potassæ Supertartratis ʒii.
Misce.

S. To be taken in syrup or molasses.

A hydragogue cathartic used in dropsy and scrofulous inflammation of the joints.

℞ Sulphuris ʒi.
Potassæ Supertartratis ʒii.
Misce.

S. To be taken in syrup or molasses.

A laxative, used in piles and cutaneous diseases.

℞ Pulveris Rhei gr. x.
Magnesiæ ʒss.
Fiat pulvis.

S. To be taken in syrup or molasses.

A laxative and antacid, used in diarrhœa, dyspepsia, &c.

℞ Pulveris Scillæ gr. xii.
Potassæ Nitratis ʒi.
Fiat Pulvis, in chartulas sex dividendus.

S. One to be taken twice or three times a day in syrup or molasses.

A diuretic employed in dropsy.

℞ Potassæ Nitratis ʒi.
Antimonii et Potassæ Tartratis gr. i.
Hydrarg. Chlorid. Mitis gr. vi.
Fiat pulvis, in chartulas sex dividendus.

S. One to be taken every two hours in syrup or molasses.

A refrigerant, diaphoretic, and alterative, used in bilious fevers; usually called *nitrous powders.*

℞ Pulveris Guaiaci.
Potassæ Nitratis āā ʒi.
Pulveris Ipecacuanhæ gr. iii.
Opii gr. ii.
Fiat pulvis, in chartulas sex dividendus.

S. One to be taken every three hours in syrup or molasses.

A stimulant diaphoretic, used in rheumatism and gout after sufficient depletion.

℞ Ferri Carbonatis Præcipitati,
Pulveris Colombæ,
Pulveris Zingiberis. ʒāāi.
Fiat pulvis, in chartulas sex dividendus.

S. One to be taken three times a day in syrup or molasses.

A tonic, used in dyspepsia and general debility.

PILLS.

℞ Pulveris Aloës,
Pulveris Rhei āā ʒss.
Saponis ℈i.
Misce, et cum aqua fiat massa in pilulas viginti dividenda.

S. Two or three to be taken daily at bed-time or before a meal.

An excellent laxative in habitual constipation.

℞ Massæ Pilularum Hydrargyri,
Pulveris Aloës,
Pulveris Rhei āā ℈i.
Misce, et cum aqua fiat massa in pilulas viginti dividenda.

S. Three to be taken at bed-time.

An alterative and laxative, useful in constipation with deranged or deficient hepatic secretion.

℞ Pulveris Aloës,
Extracti Quassiæ āā ʒi.
Olei Anisi ♏x.
Syrupi q. s.
Misce, et fiat massa in pilulas triginta dividenda.

S. Two to be taken once, twice, or three times a day.

A laxative, tonic, and carminative, useful in dyspepsia.

℞ Pulveris Scillæ ℈i.
Hydrargyri Chloridi Mitis gr. x.
Pulveris Acaciæ Gummi,
Syrupi āā q. s.
Misce, et fiat massa in pilulas decem dividenda.

S. One to be taken two or three times a day.

A diuretic and alterative, much used in dropsy, especially when complicated with organic visceral disease.

℞ Pulveris Opii gr. iv.
Pulveris Ipecacuanhæ gr. xviii.
Syrupi Acaciæ q. s.
Misce, et fiat massa in pilulas duodecim dividenda.

One to be taken after each stool.

An anodyne diaphoretic, useful in dysentery and diarrhœa after the use of laxatives.

℞ Pulveris Opii,
Pulveris Ipecacuanhæ āā gr. iii.
Hydrargyri Chloridi Mitis gr. vi.
Pulveris Acaciæ Gummi,
Syrupi āā q. s.
Misce, et fiat massa in pilulas tres dividenda.

S. One or more to be taken at bed-time, or according to circumstances.

An anodyne, diaphoretic, and alterative, very useful in diarrhœa, dysentery, typhoid pneumonia, and various other diseases.

℞. Plumbi Acetatis in pulverem triti gr. xii.
Pulveris Opii gr. i.
Pulv. Acaciæ Gummi,
Syrupi āā q. s. ut fiat massa in pilulas sex dividenda.

S. One every two, three or four hours.

An astringent much employed in hæmoptysis and uterine hemorrhage.

MIXTURES.

℞ Magnesiæ ʒi.
Syrupi f℥i.
Tere simul et affunde
Aquæ Acidi Carbonici f℥iv.
Fiat haustus.

S. To be taken at a draught, the mixture being well shaken.

An agreeable mode of administering magnesia.

℞ Mannæ ℥i.
Fœniculi contusi ʒi.
Aquæ bullientis f℥iv.
Fiat infusum et cola; dein adjice
Magnesiæ Carbonatis ʒii.
Ft. mist.

S. One third to be taken every three or four hours till it operates, the mixture being shaken.

An excellent carminative and mild laxative in flatulence and pain in the bowels.

℞ Olei Ricini f℥i.
Pulveris Acaciæ Gummi,
Sacchari āā ʒii.
Aquæ Menthæ Piperitæ f℥iii.
Gummi et saccharum cum fluiduncia dimidia aquæ menthæ tere; dein oleum adjice, et contere; denique aquam reliquam paulatim infunde, et omnia misce.

S. To be taken at a draught, the mixture being well shaken.

℞ Olei Ricini f℥i.
Vitellum ovi unius.
Tere simul et adde
Syrupi f℥ss.
AquæMenthæ Piperitæ f℥ii.
Ft. haust.

S. To be taken at a draught, the mixture being well shaken.

This and the preceding formula afford convenient modes of administering castor oil, when the stomach is irritable. Any other fixed oil may be given in the same way.

℞ Olei Ricini f℥iss.
Tincturæ Opii ♏xxx.
Pulv. Acaciæ Gummi,
Sacchari āā ʒii.
Aquæ Menthæ Viridis f℥iv.

Gummi et saccharum cum paululo aquæ menthæ tere; dein oleum adjice, [illegible] iterum tere; denique aquam reliquam paulatim infunde, et omnia misce.

S. A tablespoonful to be taken every hour or two hours till it operates, the mixture being each time well shaken.

Used as a gentle laxative in dysentery and diarrhœa. It is usually known by the name of *oleaginous mixture.*

℞ Elaterii gr. i.
Spiritûs Ætheris Nitrici f℥ii.
Tincturæ Scillæ,
Oxymellis Colchici āā f℥ss.
Syrupi f℥i.
Ft. mist.

S. A teaspoonful to be taken three or four times a day in a little water.

Diuretic, used by Ferriar in dropsy.

℞ Copaibæ,
Spiritûs Lavandulæ Comp. āā fʒii.
Mucilaginis Acaciæ f℥ss.
Syrupi fʒiii.
Simul tere; dein paulatim affunde
Aquæ f℥iv.
Misce.

S. A tablespoonful to be taken four times a day or more frequently.

Given in chronic catarrhs, and chronic nephritic affections. The dose must be larger in gonorrhœa.

Neutral Mixture.

℞ Acidi Citrici ʒii.
Olei Limonis ♏i.
Simul tere et adde
Aquæ f℥iv.
Liqua, et adde
Potassæ Carbonatis q. s. ad saturand.
Misce et per linteum cola.

Or

℞ Succi Limonis Recentis f℥iv.
Potassæ Carbonatis q. s. ad saturandum.
Misce et cola.

S. A tablespoonful to be given with an equal quantity of water every hour or two hours.

An excellent diaphoretic in fever.

Effervescing Draught.

℞ Potassæ Carbonatis ʒii.
Aquæ f℥iv.
Liqua.

Or

℞ Potassæ Bicarbonatis ʒiii.
Aquæ f℥iv.
Liqua.

S. Add a tablespoonful of the solution to the same quantity of lemon or lime juice, previously mixed with a tablespoonful of water; and give the mixture, in the state of effervescence, every hour or two hours.

An excellent diaphoretic and anti-emetic in fever with nausea or vomiting.

Brown Mixture.

℞ Pulv. Extract. Glycyrrhizæ,
Pulv. Acaciæ Gum. āā ʒii.
Aquæ ferventis f℥iv.
Liqua, et adde
Vini Antimonii fʒii.
Tincturæ Opii fʒss.
Ft. Mist.

S. A tablespoonful to be taken occasionally.

Expectorant, demulcent, and anodyne, useful in catarrhal affections.

℞ Antimonii et Potassæ Tartratis gr. i.
Syrupi Scillæ,
Liquoris Morphiæ Sulphatis āā f℥ss.
Syrupi Acaciæ f℥i.
Aquæ fluvialis f℥iv.
Ft. Mist.

S. A tablespoonful to be taken occasionally.

An expectorant and anodyne cough mixture.

℞ Acidi Nitrosi fʒi.
Tincturæ Opii gtt. xl.
Aquæ Camphoræ f℥viii.
Misce.

S. One-fourth to be taken every three or four hours.

Hope's mixture, used in dysentery, diarrhœa, and cholera.

℞ Camphoræ ʒi.
Myrrhæ ʒss.
Pulv. Acaciæ Gum.
Sacchari āā ʒii.
Aquæ f℥vi.

Camphoram cum alcoholis paululo in pulverem tere; dein cum myrrha, acaciæ gummi, et saccharo contere; denique cum aquâ paulatim instillatâ misce.

S. A tablespoonful to be taken for a dose, the mixture being well shaken.

A convenient form for administering camphor.

℞ Pulveris Kino ʒii.
Aquæ bullientis f℥vi.
Fiat infusum et cola; dein secundum artem admisce
Calcis Carbonatis Præparati ʒiii.
Tincturæ Opii fʒss.
Spiritûs Lavandulæ Compositi f℥ss.
Pulveris Acaciæ Gummi,
Sacchari āā ʒii.

S. A tablespoonful to be taken for a dose, the mixture being well shaken.

Astringent and antacid, useful in diarrhœa.

SOLUTIONS.

℞ Magnesiæ Sulphatis ℥i.
Syrupi Limonis f℥i.
Aquæ Acidi Carbonici f℥vi.
Misce.
S. To be taken at a draught.

An agreeable mode of administering the sulphate of magnesia.

℞ Potassæ Nitratis ʒi.
Antimonii et Potassæ Tartratis gr. i.
Aquæ fluvialis f℥iv.
Liqua.
S. A tablespoonful to be taken every two hours.

A refrigerant diaphoretic used in fevers.

℞ Magnesiæ Sulphatis ℥i.
Antimonii et Potassæ Tartratis gr. i.
Succi Limonis recentis f℥i.
Aquæ f℥iii.
Misce.
S. A tablespoonful to be taken every two hours till it operates upon the bowels.

Useful in fevers.

℞ Quiniæ Sulphatis gr. xii.
Acidi Sulphurici Aromatici ♏xx.
Syrupi f℥ss.
Aquæ Menthæ Piperitæ f℥i.
Misce.
S. A teaspoonful to be taken every hour or two hours.

A good mode of administering sulphate of quinia in solution.

INFUSIONS.

℞ Sennæ ʒiii.
Magnesiæ Sulphatis,
Mannæ āā ℥ss.
Fœniculi ʒi.
Aquæ bullientis Oss.
Macera per horam in vase leviter clauso et cola.
S. Give a teacupful every three or four hours till it operates.

An excellent purgative in febrile complaints.

℞ Colombæ contusæ,
Zingiberis contusi āā ℥ss.
Sennæ ʒii.
Aquæ bullientis Oi.
Macera per horam in vase leviter clauso et cola.
S. A wineglassful to be taken morning, noon, and evening, or less frequently if it operate too much.

An excellent remedy in dyspepsia with constipation and flatulence.

℞ Spigeliæ ℥ss.
Sennæ ʒii.
Mannæ ℥i.
Fœniculi ʒii.
Aquæ bullientis Oi.
Macera per horam in vase leviter clauso et cola.
S. A wineglassful to be given to a child from two to four years old, three or four times a day.

A powerful anthelmintic.

℞ Pulveris Cinchonæ Rubræ ℥i.
Acidi Sulphurici Aromatici fʒi.
Aquæ Oi.
Macera per horas duodecim, subinde agitans.
S. A wineglassful of the clear liquid to be taken for a dose.

A good method of administering Peruvian bark in cold infusion.

III. TABLES OF WEIGHTS AND MEASURES.

APOTHECARIES' WEIGHT. *U.S., Lond., Ed., Dub.*

Pound.		Ounces.		Drachms.		Scruples.		Grains.
℔ 1	=	12	=	96	=	288	=	5760
		℥ 1	=	8	=	24	=	480
				ʒ 1	=	3	=	60
						℈ 1	=	gr. 20

The Imperial Standard Troy weight at present recognised by the British laws, corresponds with the Apothecaries' weight in pounds, ounces, and grains, but differs from it in the division of the ounce, which, according to this scale, contains twenty pennyweights, each weighing twenty-four grains.

AVOIRDUPOIS WEIGHT.

Pound.		Ounces.		Drachms.		Troy grains.
℔ 1	=	16	=	256	=	7000
		oz. 1	=	16	=	437.5
				dr. 1	=	gr. 27.34375

Relative Value of Troy and Avoirdupois Weights.

Pound.		Pounds.		Pound.	Oz.	Grains.
1 Troy	=	0.822857 Avoirdupois	=	0	13	72.5
1 Avoirdupois	=	1.215277 Troy	=	1	2	280

APOTHECARIES' MEASURE. *U.S., Lond., Dub.*

Gallon.		Pints.		Fluidounces.		Fluidrachms.		Minims.		Cubic Inches.
Cong. 1	=	8	=	128	=	1024	=	61440	=	231
		O 1	=	16	=	128	=	7680	=	28.875
				f℥ 1	=	8	=	480	=	1.8047
						fʒ 1	=	♏ 60	=	.2256

Relative Value of Weights and Measures in Distilled Water at 60° Fahrenheit.

1. Value of Apothecaries' Weight in Apothecaries' Measure.

				Pints.	Fluidoz.	Fluidr.	Minims.
1 pound	=	0.7900031 pints	=	0	12	5	7.2238
1 ounce	=	1.0533376 fluidounces	=	0	1	0	25.6020
1 drachm	=	1.0533376 fluidrachms	=	0	0	1	3.2002
1 scruple	=			0	0	0	21.0667
1 grain	=			0	0	0	1.0533

2. Value of Apothecaries' Measure in Apothecaries' Weight.

				Pounds.	oz.	dr.	sc.	gr.		Grains.
1 gallon	=	10.12654270 pounds	=	10	1	4	0	8.88	=	58328.886
1 pint	=	1.26581783 pounds	=	1	3	1	1	11.11	=	7291.1107
1 fluidounce	=	0.94936332 ounces	=	0	0	7	1	18.69	=	455.6944
1 fluidrachm	=	0.94936332 drachms	=	0	0	0	2	16.96	=	56.9618
1 minim	=	0.94936332 grains	=							.9493

3. Value of Avoirdupois Weight in Apothecaries' Measure.

	Pints.	Fluidounces.	Fluidrachms.	Minims.
1 pound = 0.9600732 pints =	0	15	2	53.3622
1 ounce = 0.9600732 fluidounces =	0	0	7	40.8351

4. Value of Apothecaries' Measure in Avoirdupois Weight.

1 gallon = 8.33269800 pounds.
1 pint = 1.04158725 pounds.
1 fluidounce = 1.04158725 ounces.

In converting the weights of liquids heavier or lighter than water into measures, or conversely, a correction must be made for specific gravity. In converting weights into measures, the calculator may proceed as if the liquid was water, and the obtained measure will be to the true measure *inversely* as the specific gravity. In the converse operation, of turning measures into weights, the same assumption may be made, and the obtained weight will be to the true weight *directly* as the specific gravity.

FORMER FRENCH WEIGHTS.

Pound.	Marc.	Onces.	Gros.	Deniers.	Grains.	Troy Grains.	Grammes.
1 Poids de Marc =	2 =	16 =	128 =	384 =	9216 =	7561 =	489.5058
1 Apothecary =	1.5 =	12 =	96 =	288 =	6912 =	5670.5 =	367.1294
	1 =	8 =	64 =	192 =	4608 =	3780.5 =	244.7529
		1 =	8 =	24 =	576 =	472.5 =	30.5941
			1 =	3 =	72 =	59.1 =	3.8242
				1 =	24 =	19.7 =	1.2747
					1 =	0.8 =	.0530

Relative value of Old French and English Weights.

Poids de Marc.	Troy Weight.	Avoirdupois.	Troy Grains.
1 pound =	1.31268 ℔ =	1.080143 ℔ =	7561
1 once (ounce) =	.984504 oz. =	1.080143 oz. =	472.5625
1 gros (drachm) =	.984504 dr. =		59.0703125
1 grain =			.820421

Troy.	Poids de Marc.	French Grains.
1 pound =	0.76180 ℔ =	7561
1 ounce =	1.01574 onces =	585.083
1 drachm =	1.01574 gros =	73.135
1 grain =		1.219

Avoirdupois.	Poids de Marc.	French Grains.
1 pound =	0.925803 ℔ =	8532.3
1 ounce =	0.925803 once =	533.27

To convert French grains into Troy grains, divide by ——— Troy grains into French grains, multiply by	1.2189
——— French ounces into Troy ounces, divide by ——— Troy ounces into French ounces, multiply by	1.015734
——— French pounds (poids de Marc) into Troy pounds, multiply by ——— Troy pounds into French pounds, divide by	1.31268

FRENCH DECIMAL WEIGHTS AND MEASURES.

The French metrical system is based upon the idea of employing, as the unity of all measures, whether of length, capacity, or weight, a uniform, unchangeable standard, adopted from nature, the multiples and subdivisions of which should follow in decimal progression. To obtain such a standard, the length of one-fourth part of the terrestrial meridian, extending from the equator to the pole, was ascertained. The ten millionth part of this arc was chosen as the unity of measures of length, and was denominated *metre.* The cube of the tenth part of the metre was taken as the unity of measures of capacity, and denominated *litre.* The weight of distilled water, at its greatest density, which this cube is capable of containing, was called *kilogramme,* of which the thousandth part was adopted as the unity of weight, under the name of *gramme.* The multiples of these measures, proceeding in the decimal progression, are distinguished by employing the prefixes *deca, hecto, kilo,* and *myria,* taken from the Greek numerals; and the subdivisions, following the same order, by *deci, centi, mili,* from the Latin numerals.

The *metre,* or unity of length, at 32°	=	39.371	English inches at 62°.
The *litre,* or unity of capacity,	=	61.028	English cubic inches.
The *gramme,* or unity of weight,	=	15.44402	Troy grains.

Upon this basis the following tables, which we take with some slight alterations from the Edinburgh New Dispensatory, have been constructed; but it has been ascertained by accurate examination at the London Mint, that the gramme is only 15.434 Troy grains instead of 15.444 as above stated.

MEASURES OF LENGTH.

The metre being at 32°, and the foot at 62°.

		English Inches.		Miles.	Fur.	Yards.	Feet.	Inches.
Millimetre	=	.03937						
Centimetre	=	.39371						
Decimetre	=	3.93710						
Metre	=	39.37100	=	0	0	1	0	3.371
Decametre	=	393.71000	=	0	0	10	2	9.710
Hectometre	=	3937.10000	=	0	0	109	1	1.100
Kilometre	=	39371.00000	=	0	4	213	1	11.000
Myriametre	=	393710.00000	=	6	1	156	1	2.000

MEASURES OF CAPACITY.

		English Cubic Inches.		Apothecaries' Measure.
Millilitre	=	.061028	=	16.2318 minims.
Centilitre	=	.610280	=	2.7053 fluidrachms.
Decilitre	=	6.102800	=	3.3816 fluidounces.
Litre	=	61.028000	=	2.1135 pints.
Decalitre	=	610.280000	=	2.6419 gallons.
Hectolitre	=	6102.800000		
Kilolitre	=	61028.000000		
Myrialitre	=	610280.000000		

MEASURES OF WEIGHT.

		Troy Grains.		lb.	oz.	dr.	gr.
Milligramme	=	.0154					
Centigramme	=	.1544					
Decigramme	=	1.5444					
Gramme	=	15.4440					
Decagramme	=	154.4402	=	0	0	2	34.4
Hectogramme	=	1544.4023	=	0	3	1	44.4
Kilogramme	=	15444.0234	=	2	8	1	24.
Myriagramme	=	154440.2344	=	26	9	6	0

Though the decimal system of weights and measures was established by law in France, it was found impossible to procure its general adoption by the people, who obstinately adhered to the old *poids de marc* and its divisions, or, if they adopted the new weights, gave them the names of the old weights to which they most nearly approached. Thus the *kilogramme*, which is equal to 18,827 $\frac{15}{100}$ French grains, or 2 pounds 5 gros 35 $\frac{15}{100}$ grains *poids de marc*, was divided into two parts, and the half of it called a pound. One reason for this adherence to the old weights was the convenience of division into halves, quarters, &c., of which the new were not susceptible. To obviate this difficulty, the imperial government legalized the employment of the half kilogramme as the unity of weight, under the name of pound, and allowed this to be divided into half pounds, quarters, eighths, ounces; &c., as in the old *poids de marc*. The new pound is distinguished by the name of *metrical pound*, and has been adopted to a considerable extent; while the old weights are retained by some, particularly by the apothecaries and goldsmiths; so that three systems are now more or less in use in France—the original *poids de marc*, the decimal system, and the metrical pound with its divisions. The following table represents the relative value of these different weights.

Decimal System.		Poids de Marc.					Metrical Pound.			
		℔	oz.	dr.	gr.		℔	oz.	dr.	gr.
1 centigramme	=	0	0	0	0.19	=	0	0	0	0.18
1 decigramme	=	0	0	0	1.88	=	0	0	0	1.84
1 gramme	=	0	0	0	18.83	=	0	0	0	18.43
1 decagramme	=	0	0	2	44.27	=	0	0	2	40.32
1 hectogramme	=	0	3	2	10.71	=	0	3	1	43.2
1 kilogramme	=	2	0	5	35.15	=	2	0	0	0

Poids de Marc.		Grammes.	Metrical Pound.		Grammes.
1 grain	=	0.0531	1 grain	=	0.054
24 grains or ℈i	=	1.2747	24 grains or ℈i	=	1.302
72 grains or ʒi	=	3.8242	72 grains or ʒi	=	3.906
1 ounce	=	30.5941	1 ounce	=	31.25
1 pound	=	489.5058	1 pound	=	500.00

The following table was calculated from one in the Edinburgh New Dispensatory, in which the several weights are given in milligrammes, on the authority of Meissner, Nelkenbrecher, and Otto. It is evident that the milligrammes, by a successive division by the number 10, may be converted into the higher denominations of the French decimal weights. In these calculations the gramme is considered as equivalent to 15.44402 Troy grains.

Table of certain foreign Apothecaries' weights, exhibiting the value of a pound in milligrammes and Troy grains.

Pound.		Milligrammes.		Troy Grains.
Amsterdam wholesale	=	470401.	=	7264.88
retail	=	369003.3	=	5698.89
Austrian	=	400009.	=	6486.63
Paris	=	367129.4	=	5669.95
Bavarian since 1811	=	360000.	=	5559.85
before 1811	=	357712.5	=	5524.19
German, Prussian Russian, Danish	=	357663.9	=	5523.77
Swedish	=	356318.7	=	5502.99
Spanish	=	345027.6	=	5329.06
Venetian	=	302025.3	=	4664.48
Turin	=	307514.	=	4749.25
Florence	=	339515.	=	5243.48

Of these weights, all, except that of Paris, are divided into parts corresponding with those of the English Apothecaries' weight. In the Paris Apothecaries' weight, the gros or drachm contains 72 instead of 60 grains; but, as in the English, there are 8 drachms in the ounce, and 12 ounces in the pound.

APPROXIMATIVE MEASUREMENT.

For the sake of convenience, in the absence of proper instruments, we often make use of means of measurement, which, though not precise nor uniform, afford results sufficiently accurate for ordinary purposes. Of this kind are certain household implements, of a capacity approaching to uniformity, and corresponding to a certain extent with the regular standard measures. Custom has attached a fixed value to these implements, with which it is proper that the practitioner should be familiar; although their capacity, as they are now made, almost always somewhat exceeds that at which they were originally and still continue to be estimated.

A *tea-cup* is estimated to contain about	four fluidounces, or a gill.
A *wine-glass* - - - -	two fluidounces.
A *table-spoon* (cochlear magnum)	half a fluidounce.
A *tea-spoon* (cochlear parvum)	a fluidrachm.

Small quantities of liquid medicines are often estimated by *drops*, each of which is usually considered as equivalent to a minim, or the sixtieth part of a fluidrachm. The drop of water and of watery fluids is, on an average, about this size; but the same is by no means the case with all medicinal liquids; and the drop even of the same fluid varies exceedingly in bulk, according to the circumstances under which it is formed. This is, therefore, a very uncertain mode of estimating the quantity of liquids, and should be entirely superseded in the shops, where minim measures may be had.

The results stated in the following table were obtained by Mr. E. Durand, of Philadelphia. (See *Journ. of the Philadelphia College of Pharmacy*, i. 169.) They may be relied on as accurate; but should be considered as indicating only the relative number of drops afforded by the several liquids mentioned; for, under other circumstances than those of Mr. Durand's experiments, entirely different results might be obtained as relates to each liquid. The preparations experimented with were those of the first edition of the U.S. Pharmacopœia.

Table, exhibiting the Number of Drops of Different Liquids equivalent to a Fluidrachm.

	Drops.		Drops.
Acid Acetic (crystallizable)	120	Tincture of Assafetida, of Foxglove, of Guaiac, of Opium,	120
Acid Hydrocyanic (medicinal)	45	Tincture of Muriate of Iron,	132
Acid Muriatic	54	Vinegar, Distilled	78
Acid Nitric	84	Vinegar of Colchicum	78
Acid Nitric, Diluted (1 to 7)	51	Vinegar of Opium (black drop)	78
Acid Sulphuric	90	Vinegar of Squill	78
Acid Sulphuric, Aromatic	120	Water, Distilled	45
Acid Sulphuric, Diluted (1 to 7)	51	Water of Ammonia (strong)	54
Alcohol (rectified spirit)	138	Water of Ammonia (weak)	45
Alcohol, Diluted (proof spirit)	120	Wine (Teneriffe)	78
Arsenite of potassa, solution of	57	Wine Antimonial	72
Ether Sulphuric	150	Wine of Colchicum	75
Oil of Aniseed, of Cinnamon, of Cloves, of Peppermint, of sweet Almonds, of Olives	120	Wine of Opium	78

IV. ALPHABETICAL TABLE OF PHARMACEUTICAL EQUIVALENTS.[*]

NAMES.	COMPOSITION & SYMBOL.[†]	EQUIVALENT.
Acid, acetic	$3H+4C+3O$	51.48
crystallized	1 acid + 1 water	60.48
antimonic	$2Sb+5O$	169.2
antimonious	$2Sb+4O$	161.2
arsenic	$2As+5O$	115.4
arsenious	$2As+3O$	99.4
benzoic	$5H+14C+3O$	114.68
boracic	$B+3O$	34.9
camphoric	$8H+10C+5O$	109.2
carbonic	$C+2O$	22.12
chloric	$Cl+5O$	75.42
chlorous (Berzelius)	$Cl+3O$	59.42
citric	$2H+4C+4O$	58.48
crystallized	1 acid + 2 water	76.48
gallic	$3H+7C+5O$	85.84
hydriodic	$H+I$	127.3
hydrocyanic (prussic)	$H+(2C+N)$	27.39
hydrosulphuric (sulphuretted hydrogen)	$H+S$	17.1
hyponitrous	$N+3O$	38.15
hypophosphorous	$2P+O$	39.4
hyposulphuric	$2S+5O$	72.2
hyposulphurous	$2S+2O$	48.2
iodic	$I+5O$	166.3
kinic	$10H+15C+10O$	181.8
meconic	$2H+7C+7O$	100.84
muriatic	$H+Cl$	36.42
nitric	$N+5O$	54.15
liquid, sp. gr. 1.5	1 acid + 1½ water	67.65
nitrous	$N+4O$	46.15

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[*] This table includes the equivalents of all the simple bodies, although several of them are not used in medicine. It also embraces a few compounds which are not used in pharmacy, but which are inserted on account of their general importance. The numbers are derived from the fifth edition of Turner's Chemistry, and corrected by those contained in the second edition of Berzelius's *Théorie des Proportions Chimiques*, published at Paris in 1835.

[†] By modern chemists, the simple bodies are designated by letters, called *symbols.* The initial letter of the name is the symbol, whenever it is distinctive; but when several simple bodies have names beginning with the same letter, the plan adopted is to represent one of them by the initial letter, and the rest by the initial letter, with some other associated with it. Thus C stands for carbon, Cd for cadmium, Ca for calcium, Ce for cerium, Cl for chlorine, Cr for chromium, Co for cobalt, Cu for copper, &c. The use of these symbols saves time and space in designating the composition of compounds. Where a single equivalent is intended to be designated, the symbol of the body is simply given; but where several equivalents are to be represented, the symbol is preceded by a figure, indicating the number. Thus C means one equivalent of carbon; 2C, two equivalents; and so on. The group of letters and figures, thus used to denote the composition of any body, is called the *formula* of such body. In all cases, the constitution of compounds, however complex, may be expressed by *formulæ;* but in the above table this mode of notation is adopted only for the less complex compounds. The symbols used are those employed by Berzelius, and should not be varied from, for fear of destroying their usefulness by creating confusion.

NAMES.	COMPOSITION & SYMBOL.	EQUIVALENT.
Acid, oxalic	$2C+3O$	36.24
crystallized	1 acid + 3 water	63.24
sublimed	1 acid + 1 water	45.24
phosphoric	$2P+5O$	71.4
phosphorous	$2P+3O$	55.4
prussic. See Acid, hydrocyanic.		
succinic	$2H+4C+3O$	50.48
sulphuric	$S+3O$	40.1
liquid, sp. gr. 1.8485	1 acid + 1 water	49.1
sulphurous	$S+2O$	32.1
tannic (tannin from catechu)	$9H+18C+8O$	183.16
tannic (tannin from galls)	$9H+18C+12O$	215.16
tartaric	$2H+4C+5O$	66.48
crystallized	1 acid + 1 water	75.48
Alcohol	1 etherine + 2 water	46.48
Alum. See sulphate of alumina and potassa.		
Alumina	$2Al+3O$	51.4
trisulphate (salt in alum)	3 acid + 1 base	171.7
ALUMINIUM	Al	13.7
Ammonia	$3H+N$	17.15
acetate	1 acid + 1 base	68.63
bicarbonate	2 acid + 1 base	61.39
carbonate	1 acid + 1 base	39.27
hydrosulphate (hydrosulphuret)	1 acid + 1 base	34.25
muriate (sal ammoniac)	1 acid + 1 base	53.57
nitrate	1 acid + 1 base	71.3
sesquicarbonate	3 acid + 2 base	100.66
hydrated (med. carbonate)	1 salt + 2 water	118.66
sulphate	1 acid + 1 base	57.27
ANTIMONY, OR STIBIUM	Sb	64.6
sesquioxide (med. oxide)	$2Sb+3O$	153.2
sesquisulphuret (med. sulphuret)	$2Sb+3S$	177.5
ARSENIC	As	37.7
protosulphuret (realgar)	$As+S$	53.8
sesquisulphuret (orpiment)	$2As+3S$	123.7
BARIUM	Ba	68.7
chloride	$Ba+Cl$	104.12
crystallized	1 salt + 2 water	122.12
Baryta	$Ba+O$	76.7
carbonate	1 acid + 1 base	98.82
hydrate	1 water + 1 base	85.7
muriate	1 acid + 1 base	113.12
crystallized	1 salt + 1 water	122.12
nitrate	1 acid + 1 base	130.85
sulphate	1 acid + 1 base	116.8
BISMUTH	Bi	71
protoxide	$Bi+O$	79
Black oxide of manganese. See Manganese, deutoxide.		
oxide of mercury. See Mercury, protoxide.		
Blende. See Zinc, sulphuret.		
Blue vitriol. See Copper, sulphate of protoxide.		
Borax. See Soda, biborate.		

NAMES.	COMPOSITION & SYMBOL.	EQUIVALENT.
BORON	B	10.9
BROMINE	Br	78.4
Brucia	$18H+32C+6O+N$	275.99
CADMIUM	Cd	55.8
Calamine. See Zinc, carbonate of protoxide.		
CALCIUM	Ca	20.5
chloride	$Ca+Cl$	55.92
crystallized	1 salt +6 water	109.92
Calomel. See Mercury, protochloride.		
Camphene	$8H+10C$	69.2
Camphor	$8H+10C+O$	77.2
CARBON	C	6.12
Caustic potassa. See Potassa, hydrate.		
soda. See Soda, hydrate.		
CERIUM	Ce	46
Ceruse. See Lead, carbonate.		
Chalk. See Lime, carbonate.		
CHLORINE	Cl	35.42
CHROMIUM	Cr	28
Cinchonia	$12H+20C+O+N$	156.55
disulphate	1 acid+2 base	353.2
sulphate	1 acid+1 base	196.65
Cinnabar. See Mercury, bisulphuret.		
COBALT	Co	29.5
Codeia	$20H+31C+5O+N$	263.87
muriate	1 acid+1 base	300.29 ?
COLUMBIUM OR TANTALUM	Ta	185
Common salt. See Sodium, chloride.		
COPPER OR CUPRUM	Cu	31.6
acetate of protoxide	1 acid+1 base	91.08
crystallized (cryst. verdigris)	1 salt+1 water	100.08
black or protoxide	$Cu+O$	39.6
diacetate of protoxide (verdigris)	1 acid+2 base	130.68
red or dioxide	$2Cu+O$	71.2
sulphate of protoxide (blue vitriol)	1 acid+1 base	79.7
crystallized	1 salt +5 water	124.7
Corrosive sublimate. See Mercury, deutochloride.		
Cream of tartar. See Potassa, bitartrate.		
Creosote	$9H+14C+2O$	110.68 ?
Cyanogen	$2C+N$	26.39
Epsom salt. See Magnesia, sulphate.		
Ethal	$17H+16C+O$	122.92
Ether, acetic	1 acid+1 etherine+1 water	88.96
hydric (sulphuric)	1 etherine+1 water	37.48
hyponitrous (nitric)	1 acid+1 etherine+1 water	75.63
muriatic	1 acid+1 etherine	64.90
nitric. See Ether, hyponitrous.		
sulphuric. See Ether, hydric.		
Etherine	$4H+4C$	28.48
Flowers of zinc. See Zinc, protoxide.		
FLUORINE	F	18.68

NAMES.	COMPOSITION & SYMBOL.	EQUIVALENT.
Glauber's salt. See Soda, sulphate.		
Glucinium	G	17.7
Gold or aurum	Au	199.2
Goulard's extract. See Lead, trisacetate of protoxide.		
Green vitriol. See Iron, sulphate of protoxide.		
Hydrogen	H	1
protoxide (water)	$H+O$	9
Iodine	I	126.3
Iridium	Ir	98.8
Iron or ferrum	Fe	28
black oxide	1 protox.+1 sesquiox.	116
carbonate of protoxide	1 acid+1 base	58.12
cyanuret (Prussian blue)	$7Fe+9(2C+N)$	433.51
protiodide	$Fe+I$	154.3
protocyanuret	$Fe+(2C+N)$	54.39
protosulphuret (magnetic pyrites)	$Fe+S$	44.1
protoxide	$Fe+O$	36
red or sesquioxide	$2Fe+3O$	80
sesquichloride	$2Fe+3Cl$	162.26
sulphate of protoxide (green vitriol)	1 acid+1 base	76.1
crystallized	1 salt +6 water	130.1
tartrate of protoxide	1 acid+1 base	102.48
tritacetate of sesquioxide	3 acid+1 base	234.44
Lead or plumbum	Pb	103.6
acetate of protoxide (sugar of lead)	1 acid+1 base	163.08
crystallized	1 salt +3 water	190.08
carbonate of protoxide (white lead)	1 acid+1 base	133.72
deutoxide (puce oxide)	$Pb+2O$	119.6
iodide	$Pb+I$	229.9
protoxide (massicot)	$Pb+O$	111.6
red oxide (red lead or minium)	$3Pb+4O$	342.8
trisacetate of protox. (Goulard's ext.)	1 acid+3 base	386.28
Lime	$Ca+O$	28.5
bone-phosphate	3 acid+8 base	442.2
carbonate (chalk)	1 acid+1 base	50.62
hydrate (slaked lime)	1 water+1 base	37.5
muriate. See Calcium, chloride.		
oxalate	1 acid+1 base	64.74
tartrate	1 acid+1 base	94.98
Lithium.	L	6.44
Lunar caustic. See Silver, nitrate of oxide.		
Magnesia	$Mg+O$	20.7
carbonate	1 acid+1 base	42.82
sulphate (Epsom salt)	1 acid+1 base	60.8
crystallized	1 salt +7 water	123.8
Magnesium	Mg	12.7
Magnetic pyrites. See Iron, protosulphuret.		
Manganese	Mn	27.7
deutoxide (black oxide)	$Mn+2O$	43.7
Mannite	$7H+6C+6O$	91.72
Massicot. See Lead, protoxide.		

NAMES.	COMPOSITION & SYMBOL.	EQUIVALENT.
MERCURY OR HYDRARGYRUM	Hg	202
acetate of protoxide	1 acid+1 base	261.48
ammoniated (white precip.)	1 mur. amm.+1 perox. merc.	271.57
bicyanuret (prussiate)	$Hg+2(2C+N)$	254.78
bisulphate of peroxide	2 acid+1 base	298.2
bisulphuret (cinnabar)	$Hg+2S$	234.2
deutiodide	$Hg+2I$	454.6
deutochloride (corros. sublimate)	$Hg+2Cl$	272.84
nitrate of peroxide	1 acid+1 base	272.15
nitrate of protoxide	1 acid+1 base	264.15
peroxide (red precipitate)	$Hg+2O$	218
protiodide	$Hg+I$	328.3
protochloride (calomel)	$Hg+Cl$	237.42
protosulphuret	$Hg+S$	218.1
protoxide (black oxide)	$Hg+O$	210
sesquiodide	$2Hg+3I$	782.9
subsulphate of perox. (turpeth min.)	3 acid+4 base	992.3
sulphate of protoxide	1 acid+1 base	250.1
Minium. See Lead, red oxide.		
MOLYBDENUM	Mo	47.7
Morphia	$18H+34C+6O+N$	288.23
acetate	1 acid+1 base	339.71
muriate	1 acid+1 base	324.65
sulphate	1 acid+1 base	328.33
crystallized	1 salt +6 water	382.33
NICKEL	Ni	29.5
Nitre. See potassa, nitrate.		
NITROGEN	N	14.15
Oil of wine. See Sulphate of etherine.		
Olefiant gas	$2H+2C$	14.24
Orpiment. See Arsenic, sesquisulphuret.		
OSMIUM	Os	99.7
OXYGEN	O	8
PALLADIUM	Pd	53.3
PHOSPHORUS	P	15.7
PLATINUM	Pt	98.8
Potassa	$K+O$	47.15
acetate	1 acid+1 base	98.63
bicarbonate	2 acid+1 base	91.39
binoxalate (salt of sorrel)	2 acid+1 base	119.63
crystallized	1 salt +2 water	137.63
bisulphate	2 acid+1 base	127.35
crystallized	1 salt +2 water	145.35
bitartrate (cream of tartar)	2 acid+1 base	180.11
crystallized	1 salt +1 water	189.11
carbonate (salt of tartar)	1 acid+1 base	69.27
chlorate	1 acid+1 base	122.57
diarseniate	1 acid+2 base	209.7
diarsenite (in Fowler's solution)	1 acid+2 base	193.7
ferrocyanate	2 cyan. potassium+1 protocyan. iron	185.47

NAMES.	COMPOSITION & SYMBOL.	EQUIVALENT.
Potassa, hydrate (caustic potassa)	1 water+1 base	56.15
hydriodate. See Potassium, iodide.		
nitrate (nitre or saltpetre)	1 acid+1 base	101.3
oxalate	1 acid+1 base	83.39
sesquicarbonate	3 acid+2 base	160.66
sulphate (vitriolated tartar)	1 acid+1 base	87.25
tartrate (soluble tartar)	1 acid+1 base	113.63
POTASSIUM OR KALIUM	K	39.15
chloride	$K+Cl$	74.57
cyanuret	$K+(2C+N)$	65.54
iodide	$K+I$	165.45
iodo-hydrargyrate	1 deutiod. merc.+2 iod. potassium	785.5
Prussian blue. See Iron, cyanuret.		
Prussiate of mercury. See Mercury, bicyanuret.		
Prussic acid. See Acid, hydrocyanic.		
Puce oxide of lead. See Lead, deutoxide.		
Quinia	$12H+20C+2O+N$	164.55
acetate	1 acid+1 base	216.03
disulphate (med. sulphate)	1 acid+2 base	369.2
muriate	1 acid+1 base	200.97
sulphate	1 acid+1 base	204.65
Realgar. See Arsenic, protosulphuret.		
Red lead. See Lead, red oxide.		
precipitate. See Mercury, peroxide.		
RHODIUM	R	52.2
Rochelle salt. See Tartrate of potassa and soda.		
Sal ammoniac. See Ammonia, muriate.		
Salicin	$2H+2C+O$	22.24
Salt of sorrel. See Potassa, binoxalate.		
of tartar. See Potassa, carbonate.		
Saltpetre. See Potassa, nitrate.		
SELENIUM	Se	39.6
Silica	$Si+O$	15.5
SILICON	Si	7.5
SILVER OR ARGENTUM	Ag	108
chloride	$Ag+Cl$	143.42
nitrate of oxide (lunar caustic)	1 acid+1 base	170.15
oxide	$Ag+O$	116
Slaked lime. See Lime, hydrate.		
Soda	$Na+O$	31.3
acetate	1 acid+1 base	82.78
crystallized	1 salt +6 water	136.78
biborate (borax)	2 acid+1 base	201.1
bicarbonate	2 acid+1 base	75.54
crystallized	1 salt +1 water	84.54
carbonate	1 acid+1 base	53.42
crystallized	1 salt +10 water	143.42
diphosphate (med. phosphate)	1 acid+2 base	134
hydrate (caustic soda)	1 water+1 base	40.3
muriate. See Sodium, chloride.		
nitrate	1 acid+1 base	85.45

NAMES.	COMPOSITION & SYMBOL.	EQUIVALENT.
Soda, sesquicarbonate	3 acid+2 base	128.96
hydrated	1 salt +4 water	164.96
sulphate (Glauber's salt)	1 acid+1 base	71.4
crystallized	1 salt +10 water	161.4
tartrate	1 acid+1 base	97.78
SODIUM OR NATRIUM	Na	23.3
chloride (common salt)	Na+Cl	58.72
Soluble tartar. See Potassa, tartrate.		
Starch	5H+6C+5O	81.72
Strontia	Sr+O	51.8
STRONTIUM	Sr	43.8
Strychnia	16H+30C+3O+N	237.75
muriate	1 acid+1 base	274.17
Sugar	H+C+O	15.12
of lead. See Lead, acetate of protoxide.		
Sulphate of alumina and potassa (alum)		
	1 eq. trisulphate of alumina+1 eq. sulphate of potassa	258.95
crystallized	1 salt +24 water	474.95
Sulphate of etherine (oil of wine)	2 acid+2 etherine+1 wat.	146.16
SULPHUR	S	16.1
Sulphuretted hydrogen. See Acid, hydrosulphuric.		
Tartar emetic. See Tartrate of antimony and potassa.		
Tartrate of antimony and potassa (tartar emetic)		
	1 eq. tart. of sesquioxide of antimony+1 eq. tart. of potassa	333.31
crystallized	1 salt+2 water	351.31
Tartrate of potassa and soda (Rochelle salt)		
	1 eq. tartrate of potassa+1 eq. tartrate of soda	211.41
crystallized	1 salt+8 water	283.41
TELLURIUM	Te	64.2
Thorina	Th+O	67.6
THORIUM	Th	59.6
TIN OR STANNUM	Sn	58.9
TITANIUM	Ti	24.3
TUNGSTEN OR WOLFRAM	W	94.8
Turpeth mineral. See Mercury, subsulphate of peroxide.		
URANIUM	U	217
Urea	4H+2C+2O+2N	60.54
VANADIUM	V	68.5
Veratria	22H+34C+6O+N	292.23
muriate	1 acid+1 base	328.65 ?
Verdigris. See Copper, diacetate of protoxide.		
crystallized. See Copper, crystallized acetate of protoxide.		
Vitriolated tartar. See Potassa, sulphate.		
Water. See Hydrogen, protoxide.		
White lead. See Lead, carbonate of protoxide.		
precipitate. See Mercury, ammoniated.		
vitriol. See Zinc, sulphate of protoxide.		
Yttria	Y+O	40.2
YTTRIUM	Y	32.2
ZINC	Zn	32.3
acetate of protoxide	1 acid+1 base	91.78

NAMES.	COMPOSITION & SYMBOL.	EQUIVALENT.
Zinc, carbonate of protoxide (calamine)	1 acid+1 base	62.42
chloride - - - -	Zn+Cl	67.72
cyanuret - - - -	Zn+(2C+N)	58.69
iodide - - - -	Zn+I	158.6
protoxide (flowers of zinc) -	Zn+O	40.3
sulphate of protoxide (white vitriol)	1 acid+1 base	80.4
crystallized - -	1 salt+7 water	143.4
sulphuret (blende) - -	Zn+S	48.4
Zirconia - - - - -	2Zr+3O	91.4
ZIRCONIUM - - - -	Zr	33.7

V. CORRESPONDENCE BETWEEN DIFFERENT THERMOMETERS.

In *Fahrenheit's* thermometer, which is universally employed in this country and Great Britain, the freezing point of water is placed at 32°, and the boiling point at 212°, and the number of intervening degrees is 180.

The *Centigrade* thermometer, which has long been used in Sweden, under the name of Celsius's thermometer, and is now most generally employed on the continent of Europe, marks the freezing point *zero*, and the boiling point 100°.

In *Reaumur's* thermometer, used in France before the revolution, the freezing point is at zero, and the boiling point at 80°.

In *De Lisle's* thermometer, used in Russia, the graduation begins at the boiling point, which is marked *zero*, while the freezing point is placed at 150°.

From the above statement it is evident that 180 degrees of Fahrenheit are equal to 100° of the centigrade, 80° of Reaumur, and 150° of De Lisle, or 1 degree of the first is equal to $\frac{5}{9}$ of a degree of the second, $\frac{4}{9}$ of a degree of the third, and $\frac{5}{6}$ of a degree of the last. It is easy, therefore, to convert the degrees of one into the equivalent number of degrees of the other; but in ascertaining the corresponding points upon the different scales, it is necessary to take into consideration their different modes of graduation. Thus, as the zero of Fahrenheit is 32° below the point at which that of the centigrade and of Reaumur is placed, this number must be taken into account in the calculation. The following propositions will embrace all the cases which can arise in relation to the three last mentioned thermometers. That of De Lisle is seldom or never referred to in works which are read in this country.

1. If any degree on the *centigrade* scale, either above or below zero, be multiplied by 9 and divided by 5, or if any degree of *Reaumur* above or below zero be multiplied by 9 and divided by 4, the quotient will, in either case, be the number of degrees above or below 32° or the freezing point of *Fahrenheit.*

2. The number of degrees between any point of *Fahrenheit's* scale and 32°, if multiplied by 5 and divided by 9, will give the corresponding point on the *centigrade;* if multiplied by 4 and divided by 9, will give the corresponding point on the scale of *Reaumur.*

3. Any degree of the *centigrade* multiplied by 4 and divided by 5, will give the corresponding degree of *Reaumur;* and conversely, any degree of *Reaumur* multiplied by 5 and divided by 4, will give the corresponding degree of the *centigrade.*

VI. TABLE,

SHOWING THE SPECIFIC GRAVITY CORRESPONDING WITH THE SEVERAL DEGREES OF BAUME'S AND BECK'S HYDROMETERS.

Baumé's hydrometer is usually employed in France. In this instrument, the sp. gr. of distilled water is assumed as the zero of the descending scale, in relation to fluids heavier than itself, while it is assumed as 10 on the ascending scale, in relation to lighter fluids. In the Pharmacopœia Batava, a modification of the instrument has been adopted, in which the sp. gr. of distilled water has been assumed as the zero of both scales. This modification has also been adopted by the authors of the French Codex, and the sp. gr. corresponding to the several degrees of this scale is given below. Beck's hydrometer is used in Germany.

For Liquids lighter than Water.

Degree of hydrometer.	Specific Gravity.			Degree of hydrometer.	Specific Gravity.		
	By Baumé.	In Pharm. Batava.	By Beck.		By Baumé.	In Pharm. Batava.	By Beck.
0		1000	1.0000	32	0.8638	819	0.8415
1		993	0.9941	33	0.8584	814	0.8374
2		987	0.9883	34	0.8531	810	0.8333
3		980	0.9826	35	0.8479	805	0.8292
4		974	0.9770	36	0.8428	800	0.8252
5		967	0.9714	37	0.8378	796	0.8212
6		961	0.9659	38	0.8329	792	0.8173
7		954	0.9604	39	0.8281	787	0.8133
8		948	0.9550	40	0.8233	782	0.8095
9		941	0.9497	41	0.8186	778	0.8056
10	1.0000	935	0.9444	42	0.8139	774	0.8018
11	0.9930	929	0.9392	43	0.8093	770	0.7981
12	0.9861	923	0.9340	44	0.8047	766	0.7943
13	0.9792	917	0.9289	45	0.8001	762	0.7906
14	0.9724	911	0.9239	46	0.7956	758	
15	0.9657	906	0.9189	47	0.7911	754	
16	0.9591	900	0.9139	48	0.7866	750	
17	0.9526	895	0.9090	49	0.7821	746	
18	0.9462	889	0.9042	50	0.7777	742	
19	0.9399	884	0.8994	51	0.7733		
20	0.9336	878	0.8947	52	0.7689		
21	0.9274	873	0.8900	53	0.7646		
22	0.9212	868	0.8854	54	0.7603		
23	0.9151	863	0.8808	55	0.7560		
24	0.9091	858	0.8762	56	0.7518		
25	0.9032	852	0.8717	57	0.7476		
26	0.8974	847	0.8673	58	0.7435		
27	0.8917	842	0.8629	59	0.7394		
28	0.8860	837	0.8585	60	0.7354		
29	0.8804	832	0.8542	61	0.7314		
30	0.8748	828	0.8500	62	0.7251		
31	0.8693	823	0.8457				

For Liquids heavier than Water.

Degree of hydro-meter.	Specific Gravity.			Degree of hydro-meter.	Specific Gravity.		
	By Baumé.	In Pharm. Batava.	By Beck.		By Baumé.	In Pharm. Batava.	By Beck.
0	1,0000	1000	1.0000	41	1.3947	1398	1.3178
1	1.0070	1007	1.0059	42	1.4082	1412	1.3281
2	1.0141	1014	1.0119	43	1.4219	1426	1.3386
3	1.0213	1022	1.0180	44	1.4359	1440	1.3492
4	1.0286	1029	1.0241	45	1.4501	1454	1.3600
5	1.0360	1036	1.0303	46	1.4645	1470	1.3710
6	1.0435	1044	1.0366	47	1.4792	1485	1.3821
7	1.0511	1052	1.0429	48	1.4942	1501	1.3934
8	1.0588	1060	1.0494	49	1.5096	1516	1.4050
9	1.0666	1067	1.0559	50	1.5253	1532	1.4167
10	1.0745	1075	1.0625	51	1.5413	1549	1.4286
11	1.0825	1083	1.0692	52	1.5576	1566	1.4407
12	1.0906	1091	1.0759	53	1.5742	1583	1.4530
13	1.0988	1100	1.0828	54	1.5912	1601	1.4655
14	1.1071	1108	1.0897	55	1.6086	1618	1.4783
15	1.1155	1116	1.0968	56	1.6264	1637	1.4912
16	1.1240	1125	1.1039	57	1.6446	1656	1.5044
17	1.1326	1134	1.1111	58	1.6632	1676	1.5179
18	1.1414	1143	1.1184	59	1.6823	1695	1.5315
19	1.1504	1152	1.1258	60	1.7019	1714	1.5454
20	1.1596	1161	1.1333	61	1.7220	1736	1.5596
21	1.1690	1171	1.1409	62	1.7427	1758	1.5741
22	1.1785	1180	1.1486	63	1.7640	1779	1.5888
23	1.1882	1190	1.1565	64	1.7858	1801	1.6038
24	1.1981	1199	1.1644	65	1.8082	1823	1.6190
25	1.2082	1210	1.1724	66	1.8312	1847	1.6346
26	1.2184	1221	1.1806	67	1.8548	1872	1.6505
27	1.2288	1231	1.1888	68	1.8790	1897	1.6667
28	1.2394	1242	1.1972	69	1.9038	1921	1.6832
29	1.2502	1252	1.2057	70	1.9291	1946	1.7000
30	1.2612	1261	1.2143	71	1.9548	1974	1.7172
31	1.2724	1275	1.2230	72	1.9809	2002	1.7347
32	1.2838	1286	1.2319	73	2.0073	2031	1.7526
33	1.2954	1298	1.2409	74	2.0340	2059	1.7708
34	1.3072	1309	1.2500	75	2.0610	2087	1.7895
35	1.3190	1321	1.2593	76		2116	1.8085
36	1.3311	1334	1.2687	77			1.8280
37	1.3434	1346	1.2782	78			1.8478
38	1.3559	1359	1.2879	79			1.8681
39	1.3686	1372	1.2977	80			1.8889
40	1.3815	1384	1.3077				

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FINIS.

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